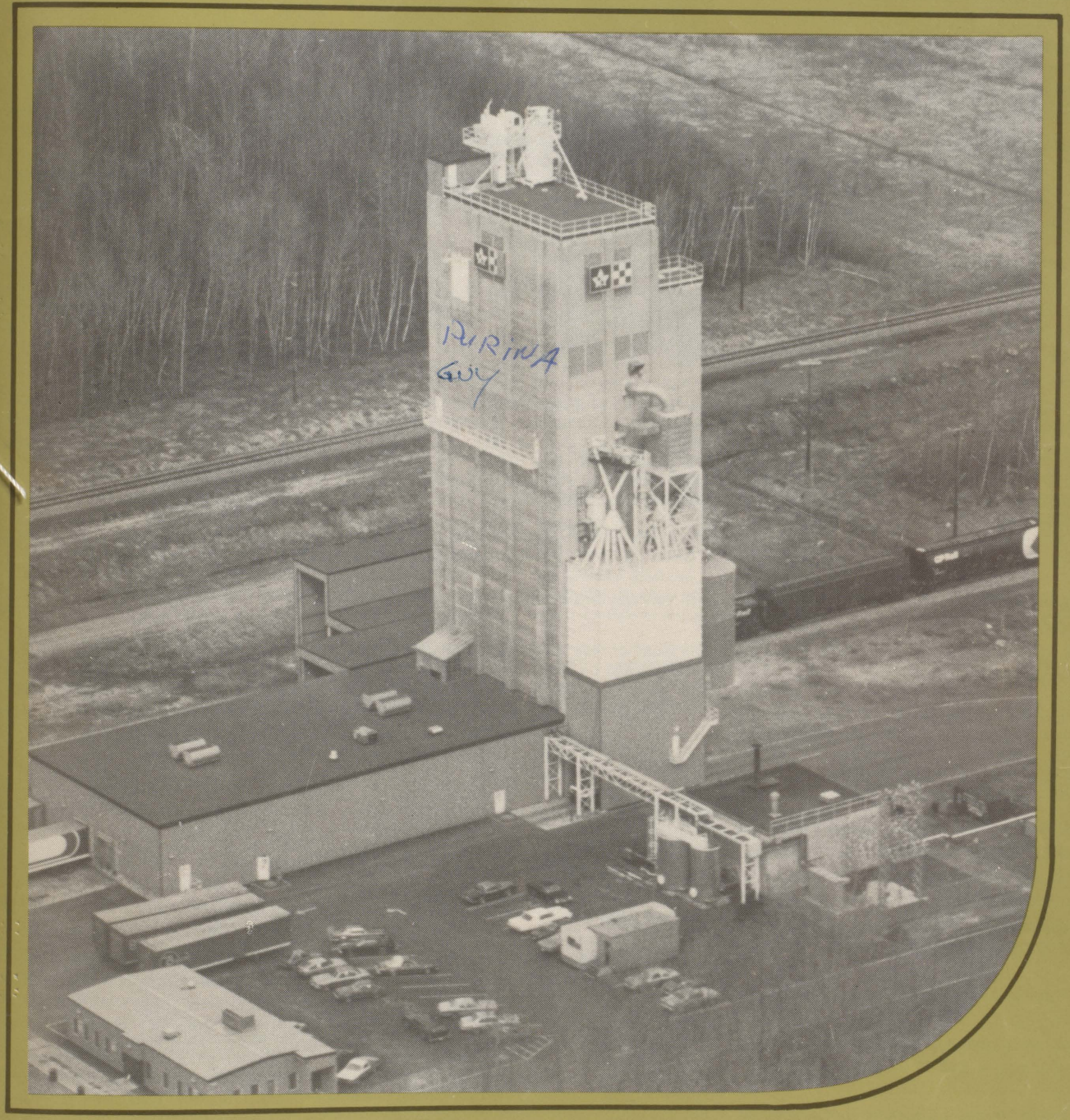
THE MACDONALD JOURNAL

NOVEMBER 1982



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This Issue Page

Features

Cover Story

Three Macdonald graduates, one at Macdonald and two in agribusiness, are in accord on one point: agribusiness is big business. But, are agricultural graduates being properly equipped to cope with this bigness? What changes are required in business-oriented courses and in the attitudes and knowledge of faculty toward the world beyond the campus gates? Too many ivory towers? Are we "telling it like it is." Our thanks to these three gentlemen who lead off what we hope is a stimulating look at agribusiness and some aspects of Macdonald's involvement in that area. Our cover, chosen from a wide selection depicts an agricultural industry in a rural environment (near Drummondville) close to various modes of transportation. The photo also looks very like November, the month we devote to the agribusiness community. We hope the issue will evoke some comments. Let's hear from you.

Agribusiness Gains Recognition at Macdonald

y Dr. G. Coffin, B.Sc. (Agr.) '62
hairman, Department of Agricultural Economics

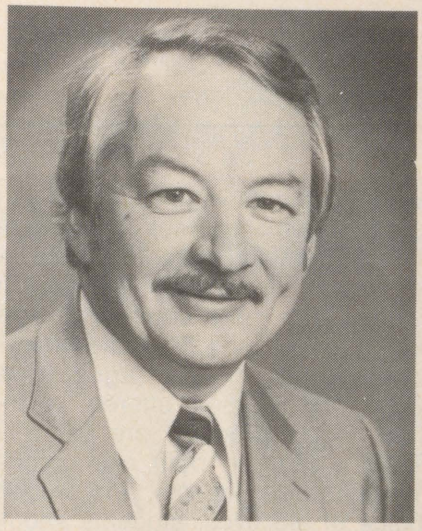
gribusiness has come of age as a tal component of the Canadian food ystem. The importance of the com-anies, co-operatives, and other agen-es which supply farm inputs and ansport, process, and market griculture and food products cannot e denied. Agribusiness has become IG business and has a big role to play the future of Canadian agriculture.

Some idea of the magnitude of gribusiness activity in Canada can be ained from the fact that 60 cents of e consumer food dollar is absorbed / processing and other marketing osts and margins incurred between e farm gate and the consumer. On n annual basis, this amounts to some 12 to $15 billion.

This aspect of agribusiness is fairly bour-intensive. As one of the leading dustries in Quebec, food and everage manufacturers employ some) thousand people with shipments lued at $6-1/2 billion in 1979. The rresponding figures for Canada are 33 thousand employees and ship-ents valued at more than $25 billion, cluding the raw-value of the farm pro-ucts processed. The relative impor-nce of the major industries in food nd beverage manufacturing in anada is illustrated in Table 1 in rms of employment and the value of ipments.

The other side of agribusiness, mely the farm input suppliers, has own rapidly along with the large-ale, specialized farm units relying eavily on purchased inputs. In 1981, r example, Canadian farmers spent 2.3 billion (out of $18.4 received m the sale of farm products) to cover rm operating expenses. Just under o billion of that total was spent by uebec farmers. The leading cate-ories of inputs, in terms of expen-tures, are illustrated in Table 2 for uebec and Canada.

There is another aspect to the size agribusiness. Not only are the total llar values large, but some of the gest companies are heavily involv-in the agriculture and food system.



A few of the larger companies with agribusiness involvement in Canada are listed in Table 3 along with information on sales, rank, and number of employees as reported in *The Financial Post 500* (June 1982). This listing is by no means exhaustive; it is intended only to illustrate the size and relative importance of a few of the better known organizations with interests in food and agriculture. Quebec based retailers and co-operatives occupy prominent places in this listing.

Obviously, with sales and assets in the billions of dollars and with personnel numbering in the thousands, the importance of agribusiness is undeniable. But its importance to the food system, and especially to the farming community, goes beyond the mere counting of dollars and personnel. The value of the goods and services provided by agribusiness becomes most evident when they are suddenly withdrawn as through the bankruptcy or forced closing of a feed mill or abattoir, thus requiring the clientele to go elsewhere, perhaps much further afield. The inability to acquire an input when it is needed, or market a product when it is ready, can be very costly to a farming operation.

Table 1. **Value of shipments and number of employees in food manufacturing in Canada, 1979**

Industry	Value of Shipments of own Manufacture	Number of Employees
	($000)	(thousands)
Slaughter and Meat Processors	6,587	34.6
Dairy Products Industry	3,790	26.3
Fruit and Vegetable Canners	1,119	13.3
Bakery Products Industry	1,408	33.0
Total-Food and Beverage[a]	25,373	233.2

[a] Includes livestock feeds, fertilizers, and farm implements.

Table 2. **Farm expenses for major input categories in Quebec and Canada, 1981**

Input Category	Quebec	Canada
	(million dollars)	
Interest on debt	240.6	2,168.1
Machinery parts and supplies	189.8	2,031.4
Fertilizer and lime	136.5	1,092.6
Pesticides	25.7	399.9
Other crop expenses	73.8	446.5
Livestock feed	701.8	2,060.0
Other livestock expenses	53.2	676.0
Wages to farm labour	141.7	968.0
Total operating expenses	1,878.1	12,295.4
Depreciation charges	222.8	2,386.7
Total operating and depreciation	2,101.0	14,682.1

Relations between agribusiness firms and the farming community are not always harmonious. They have often been on opposite sides of policy issues, such as the setting up of marketing boards, for example. Indeed, agribusiness policy and practice has sometimes been a contributing factor in the drive to establish marketing boards. One result of the struggle to survive the current period of economic difficulty is an increased awareness by all parties of the extent to which they are interdependent. There is also a growing appreciation that government can only do so much to maintain the well-being of the agri-food system and we may be approaching that limit. Hence, future success of the agri-food system will require close co-operation among primary producers, agribusiness, and government. The agribusiness sector will have a vital role to play in that situation.

Agribusiness Education

Despite the size and importance of agribusiness activity, and the growing demand for professionally trained personnel in this field, there has been relatively little formal recognition of the needs of this sector in education circles. In particular, universities throughout North America have been slow to develop and offer courses and training programs geared to the requirements of career opportunities in agribusiness. According to American educator Kenneth Duft[1], the needs of the agribusiness community, in terms of research, literature, and training, have tended to fall through the space between the disciplines of business administration and agricultural economics.

Fortunately, the situation is changing. Literature devoted to agribusiness management, marketing, finance, and related areas is beginning to emerge and university courses are being developed to better prepare students for the challenges of a career in this field. Several courses of this nature have been introduced at Macdonald over the past few years. Now, as a further step, the Bachelor of Science program in Agricultural Economics is being rearranged (subject to University approval) to offer an agribusiness orientation and an agrisystems orientation within the program. The agribusiness orientation will consist of a concentration of courses emphasizing management and marketing while the agrisystems orientation will contain courses with more emphasis on research, policy analysis, and economic development. These agricultural economics courses offered in the B.Sc. (Agr.) program are listed in Figure I showing both orientations. Through these courses, and prudent choice of electives, students should acquire an appreciation of management principles and practices as well as of the economic environment in which agribusiness operates.

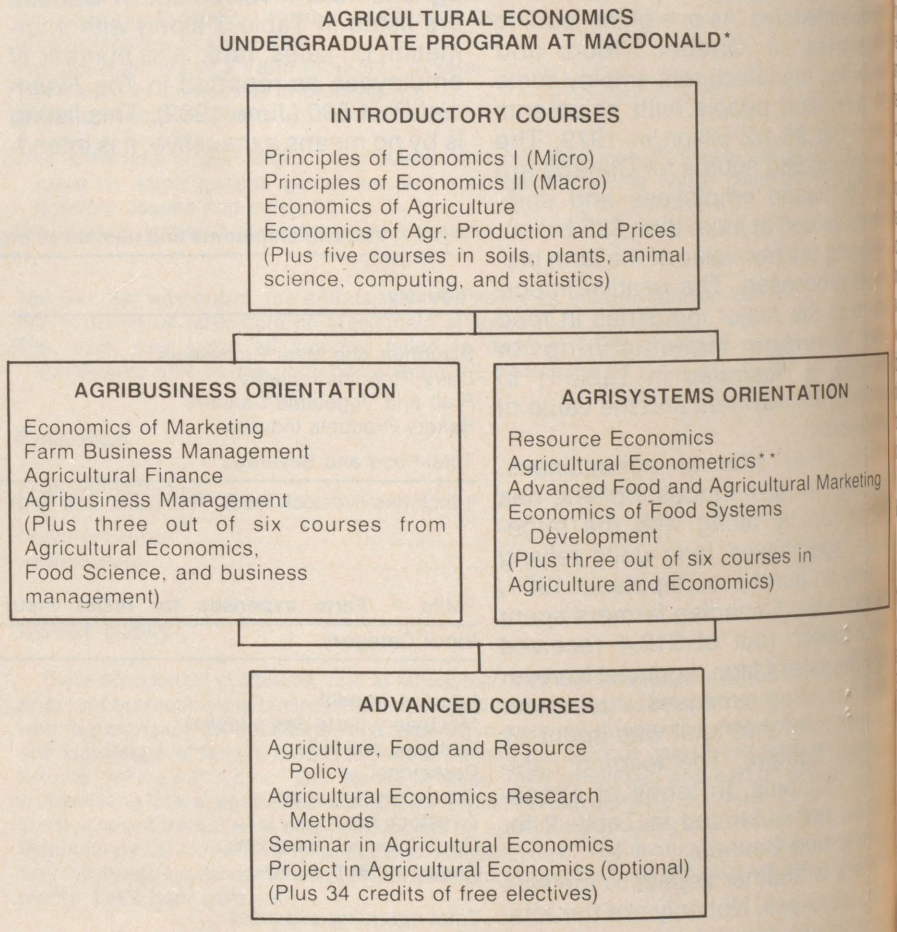
Table 3. **Selected companies with Canadian agribusiness interests, 1981**

Company	Sales or Operating Revenue	Rank (based on sales)	Number of Employees
	(million dollars)		
George Weston Limited	7,428.6	4	60,000
Provigo	3,294.0	14	12,926
Massey-Ferguson	3,175.0	15	39,789
Canada Packers Limited	2,943.1	22	14,000
Steinberg Inc.	2,806.4	26	26,000
Saskatchewan Wheat Pool	1,941.4	40	4,200
Co-op Fédérée de Québec	1,075.9	74	3,139
Kraft Limited	660.5	106	2,812
United Co-operatives of Ontario	604.0	113	2,100
McCain Foods Limited	595.0	116	6,000
Agropur (Granby, Que.)	526.9	132	2,018

Source: *The Financial Post 500*, McLean-Hunter Limited, Toronto, June 1982.

Graduate Studies

In addition to the B.Sc. program, the Department of Agricultural Economics has been developing a graduate program leading to a Master of Science degree. This program also contains



*Pending authorization
**Proposed new course

Figure I

hree management-type courses which re offered as electives in the Masters f Business Administration (MBA) pro- ram through Continuing Education at IcGill.

While the graduate program in gricultural economics has not yet een fully approved, several students ave been admitted under an *ad hoc* rrangement to study for the M.Sc. ive students have earned this degree ver the past five years, and they have et high standards in doing so. For xample, in two of the past three ears, Macdonald M.Sc. graduates ave been awarded the Canadian gricultural Economics Society prize or the best Master's thesis. These inners (with thesis title and year in arenthesis) were: Mr. Leslie MacCart- ey (Price and Sensory Preference For randed Food Products-1979) now orking with Statistics Canada and Mr. rian Hayward (The Demand for Rail ransportation of Feed Grain In astern Canada — 1981) now working ith United Grain Growers in Win- ipeg.

One aspect of the training program hich remains to be developed over he next few years is a cooperative ar- angement with agribusiness whereby he student would receive credits for ork performed under supervision in company as part of his training. Such rograms already exist at a few other nstitutions and in several other profes- ions. They can be beneficial for all oncerned and should provide an venue for closer collaboration be- ween the universities and part of the ommunity they serve. The possibility f establishing such a program at Mac- onald will receive serious considera- on.

esearch and Cooperation

In addition to the award-winning heses mentioned above, other areas f research which have been under- aken in the Department of Agricultural conomics include the following:

- the impact of energy costs on Quebec agriculture;
- economic feasibility of gasohol production in eastern Canada;
- economics of beef production in Quebec;
- regional comparative advantage and export potential for Canadian pork;
- food marketing costs and price spreads;
- demand for generic food products in Canada.

These and other topics comprise an ambitious research program now in progress on important aspects of Quebec agriculture. The results should be of interest to the agribusiness community as well as to policy makers and primary producers.

There are other avenues of association between the University and the agribusiness sector. For many years, Macdonald staff have collaborated with agribusiness on an individual basis in various areas of research. Agribusiness personnel often do guest lecturing at Macdonald and are frequently invited to participate in seminars and conferences. Some are even engaged on a regular basis as part-time lecturers. Others are called upon to serve in an advisory role as auxiliary professors. The Department of Agricultural Economics has put emphasis on developing and maintaining this type of input and liaison with the agribusiness community and will continue to do so.

Other departments have also worked to develop and maintain liaison with agribusiness groups. For example, the Department of Animal Science has worked with the Canadian Feed Industry Association (Quebec Division) in the organization of annual, jointly sponsored conferences on animal nutrition and related areas. All of these and other activities help to maintain lines of communication and keep people in both areas up-to-date and interested in expanding their knowledge.

But there are opportunities — indeed, there is even a necessity — for more collaboration in the future. In arguing for such collaboration between universities and business, Charles Ping, President of Ohio University, states: "As the principal consumer of our prime product (the graduates), business should be an important interpreter of our worth. In recognizing the "academic" accomplishment of business in the fields of planning and research, the university can lend its own intellectual support to the defence of the system. Recognition of worth is the basis of support."[2]

References

1. Duft, Kenneth H. *Principles of Management In Agribusiness*, Reston Publishing Company, Reston, Virginia, 1979.
2. Ping, Charles J. *Bigger Stake For Business in Higher Education*, Harvard Business Review — September-October 1981.

Prize-Winning Reports

Some of the senior agricultural engineering students have been covering themselves with glory in both national and international competition in the engineering report preparation.

Kevin J. Sibley's report entitled "Simulation of a Buried Air Duct Network for Energy Conservation in a Greenhouse" was awarded first place standing in the National Student Paper Competition of the Canadian Society of Agricultural Engineering (CSAE). The same paper achieved first place standing in the student paper competition of the North Atlantic Region — American Society of Agricultural Engineers (NAR-ASAE) as well as fifth place standing in the national competition of ASAE.

Denis Millette's paper entitled "Brassage des fumiers semi-liquides provenant d'une étable de Boivins Laitiers avec de l'air comprimé" was awarded second prize in the CSAE competition.

In the NAR-ASAE competition second and third places were captured by Macdonald students as well: Laurent Gauthier for his paper "The Development of a Microcomputer-based Farm Management Package," and Graham Drake for his report "Evaluation of Zero Till Planters in Various Soil Conditions."

AGRICULTURAL EDUCATION
AN AGRIBUSINESS VIEW

by Byron E. Beeler, B.Sc. (Agr.) '58
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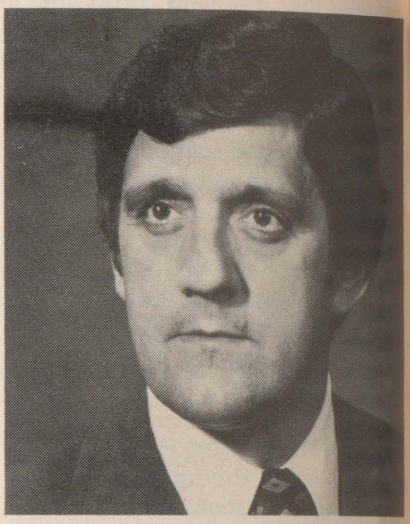

Agriculture in Canada is in turmoil! The agricultural scene in 1982 is neither pleasant nor the immediate future optimistic. We hear about farm and agribusiness bankruptcies at an increasingly alarming rate. When the shake-down is over, someone is going to have to pick up the pieces and build a stronger "fabric" for the future. The real challenge facing faculties of agriculture — can they keep pace with the change, the turmoil, and the requirements for their product (students) in the marketplace?

In these difficult times the major role that agribusiness has played over the years will come sharply into focus. Generally speaking, the importance of agribusiness in food production systems has not been recognized even though agribusinesses have tremendous investments and risk involvement. The extent of the recognition of this fact has varied between and within faculties of agriculture.

Training programs in many faculties have been geared to placing students in government services or other public agencies. This narrow perspective has resulted in a civil service that also has a limited view of its role in the agricultural production system. Indeed, many do not even recognize that a system of several interrelated parts exist in agriculture. While this is a rather wide-sweeping, all-condemning statement, examples are available for support. In my experience, the problem of narrow perspective is greatest at the regulatory level, less at the advisory level. The tendency at the advisory level is to feel that the civil servant is only an advisor to the farmer and any association with agribusiness is frowned on. There is little recognition that the advisory service deals with only 15 to 20 per cent of the farm population. Where do the other 80-85 per cent of the farmers get their advice? Having spent a number of years in government advisory work and now in agribusiness, I am aware of the tremendous amount of technology that is given out across the counter in an agribusiness setting. I believe, too, that many people have been preoccupied with the "power" of government, without recognizing that governments do not generate wealth. Governments can only distribute the wealth generated in the private sector.

Current Agricultural Situation

There is a lot of talk about our ability or lack of ability to feed the Third World nations. The fact is we could feed these have-not nations today, tomorrow, and into the future if we could just find some equitable system which didn't leave the food producers holding the bag. The United States is facing its second consecutive year of record crops of corn and soybeans — and where will it be stored? We never have been successful in sorting out the boom and bust years in agriculture — we take what Mother Nature gives us, as our "production factory" has no roof. Over the next few months the high cost of borrowed capital and commodity prices at or below the cost of production will result in a continued shake-down in the food production system. Any farm or agribusiness which made an untimely decision to expand is facing tough economic times, particularly if that business had a low equity base prior to expansion.

Agriculture in Canada is a mirror image of events in the United States. The error in estimating the corn crop in the United States usually represents more corn than we grow in Canada. When tough times hit the agricultural industry of the United States, we in Canada feel the shock waves quickly "like a mouse sleeping beside the elephant." Watch out Canada, the elephant is about to roll over. There will be more bankruptcies in 1983, consolidation will take place, there will be need for better advisory, financial, and management inputs for those who are charged with picking up the pieces and going forward into the future.

On the subject of consolidation, one prediction made in the United States is "that by the year 2000, 50 per cent of the food will be produced by one per cent of the food producers." If this prediction turns out to be correct, how many assistants would such a farmer need? Would he require computer programmers and operators, market research specialists, top- flight business managers, and would he have a bank president on his board of directors? Where would an agricultural degree graduate be required?

Current Agricultural Training

Before discussing the future, perhaps it would be well to review where I think we are now. I am told that 70 per cent of the students enrolled in agriculture today come from an urban background and that nearly half of the students are women. I have not taken time to document either point; however, if they are accurate, then I have not seen any major attempt at any agricultural faculty to ensure that students receiving degrees in agriculture know something of the "art" of agriculture as well as the science and theory. The trend to more urbanites in agriculture has been underway for some time. It has been suggested that more and more professors also have a non-farming background. Which is the poorest risk in teaching — an ur-

banite or a rural-oriented person who has been in the "ivory tower" so long that his knowledge of the total production system is passé? Obviously, both can be hazards if we are counting on their clients to fulfil the future needs of the agricultural community. There is more to modern agriculture than science, the "art" of agriculture is still mighty important.

What about the professor who has a great knowledge of practical agriculture, may even be a great scientist and a great community person, but is terrible as a teacher? From the outside, it always appeared to me that adequate training in teaching was not required by someone seeking a professional appointment as long as that person held the necessary degree qualifications. It seems that tenure is assured for the best and poorest professors and things like survival, growth and progress, and quality of life can be taken for granted once inside the system. Management at universities is not tough enough in managing its people resources. It might be interesting if the Department Head or Faculty Dean asked, "if this person didn't have a job here, would this person be employable elsewhere?"

Let's hope that these tough economic times bring a return of tough management and an expectation that an employee has an obligation to the employer and to the clients. In this respect, the need for tougher management is just as great in industry as at the university.

Educational Requirements for the Future

To plan the core subjects to ensure maximum impact and usefulness for the future, it is necessary to recognize the fundamental changes that have taken place in recent years. First, it is not uncommon for a farmer to have a $1 million investment for every person employed on the farm. Second, agribusiness has been and will continue to be a dominant force in the food production system with more unique, separate, and district requirements in employee training than will be required by government employers. I believe there are four major areas that the faculties of agriculture must seriously consider to ensure that their end products are useful:

1. Who is an Agricultural Specialist?

Is it sufficient that a person coming from an urban background receives only four years (three years following CEGEP in Quebec) of lectures and is granted a Bachelor of Science degree in Agriculture? I think not. Is not agriculture as important as medicine? There should be a period of internship prior to granting the degree. At least one faculty of agriculture is now offering a co-op training course in Canada. This is definitely a move in the right direction. In a business such as a seed company, summer students see only the summer activities of a very seasonal operation. The work activities vary widely throughout the calendar year. A co-op student would have a better grasp of the facts and, therefore, be better qualified to meet the challenge on graduation.

2. Better Financial Understanding

Business investment at the farm level and in agribusiness is already large. Agricultural graduates should be better trained in understanding balance sheets? The old style economic courses — "on one hand. . . but then on the other hand" — are just not good enough in today's economic climate. More attention needs to be paid to courses that would give partial credits toward a Chartered Accountant's degree. More emphasis needs to be put on how, when, and why market and marketing research is accomplished. In these tough times, surely training in strategic planning is essential.

3. More University — Agribusiness Personnel Exchanges

If we can promote more exchange of personnel between agricultural faculties and agribusiness, both would benefit. Professors would have a unique feel for the tremendous breadth and scope of jobs that have to be done inside a business environment. Businessmen would bring the touch of realism to the classroom and possibly get a better appreciation of the challenges facing faculty members.

If I divided our seed business into four distinct sections, those sections would be designated as follows: a) Research and Development; b) Operations; c) Marketing/Sales; d) Administration/Planning. Inside the R & D department the range of skills is interesting — a Ph.D. in plant breeding, highly qualified technical skills, mechanical knowledge, knowledge of farming activity, as well as the skills of management. Above all, plant breeders in industry must understand the necessity of moving a new cultivar along as quickly as desirable. At CIBA-GEIGY Seeds Ltd., our Research Director is Dr. Robert Brawn, a former professor of plant breeding and genetics at Macdonald. I am also pleased to advise that Professor Harold Klinck of Macdonald will be joining us for a two-month period (October/November 1982) as part of his sabbatical leave program. We expect that Dr. Klinck will be a major asset and will have an excellent input into our barley breeding program. I believe also that Dr. Klinck will have his interest and attention caught by some of our seed conditioning technology and marketing programs. Exchanges such as this can only benefit both the educational institution and the business firm.

4. Communication Skills

More time and attention needs to be spent on training students in the fundamentals of communication. I believe that skills in writing, in public speaking, and in proper use of visual aids are generally lacking. We have tended to underestimate training in these areas in the past few years. Even a return to the debating clubs of 30 years ago would be beneficial. A person trained in effective communication has an advantage when it comes to being hired and surviving in these tough times.

In summary, all sectors of the agricultural production system will be severely challenged to meet the demands of tough economic times and still meet the challenge of feeding the Third World nations. The challenge to survive as a farmer or as a business is also great in these difficult times that may well be around for several years.

Training students who can cope with the dynamics of large investments, rapid change, high risks, and better strategic thinking is clearly the challenge facing agricultural faculties — at least that's how I see it from an agricultural business viewpoint.

OPPORTUNITIES AND CHALLENGES OF AN Agribusiness Career

by Val Swail, B.Sc. (Agr.) '48
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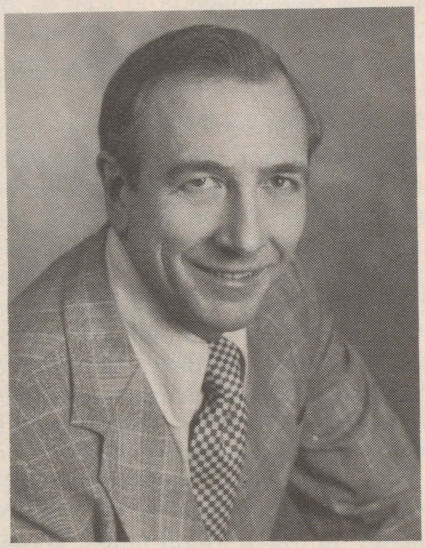
All of the various areas and facets that come under the general heading of agribusiness today make up a very large and diversified industry indeed. Since most of my personal career has been in the feed sector of agribusiness, I will attempt to cover my topic from that point of view. However, I think it fair to say that the basic aim of the total agribusiness sector is, or should be, a common one. That is: to produce efficiently high quality food at the cheapest possible price to the consumer and at a fair and reasonable profit to the producer. Whether it be in the area of the production of meat, milk, or eggs — which is the primary concern of the feed industry — or in the production of cereal grains, fruits, or vegetables where machinery, chemicals, fertilizers, and so on play a larger role, the agribusiness sector has a responsibility to its customers to improve the efficiency and unit cost of production of the end product — food.

While this may seem to be a perfectly obvious and very simple statement, it is not always as simple a task as you might at first think. Improvements in production efficiency invariably require changes. Changes in feeding practices, in management practices, in crop rotations, in crop varieties, in chemical or drug usages and many others. Changes are not that easy to come by. People, generally, resist change, and agriculture is probably a leader in this resistance. However, the true leaders in the agribusiness sector are those companies who have led the way in innovative thinking and change to the betterment of the basic goal of more efficient production of food. More often than not this means taking the slower, more costly route, rather than the quick success or gimmicky one. It requires a higher degree of salesmanship because it often involves an investment now for greater benefits later — rather than the quick buck now.

This is where the challenge to a career in agribusiness comes in. The challenge is to the individual seeking the career, and the challenge is also to the institution providing the skills, the direction of purpose, and the motivation to the individual. Agribusiness is people. Companies are people. The success of the company, or the individual, will be largely dependent on the degree of success it or he can generate in the marketplace with the customers.

This brings us now to the needs of the marketplace. I stress again that this is primarily from a point of view of the feed business, but I believe the



principles apply to any sector. The primary needs are:

(1) Research, nutrition, and feeding practices;
(2) Financial planning;
(3) General management;
(4) Adequate production records.

While there is always a continuing need, I believe that generally speaking the needs of (1) and (2) are well taken care of. Certainly, the proof of the pudding is there when you look at the strides that have been made in feed efficiency or conversion in the production of meat, milk, or eggs over the past several years. In egg production we have seen the norm of 220 eggs per hen housed on a feed conversion of 4.2 lb of feed per dozen eggs go to a current norm of 280 eggs on a feed conversion of 3.8. Chicken broilers going from a 4-lb bird in 7-1/2 weeks on a feed conversion of 2.2 to a 4-lb bird in 6 weeks with a 1.9 feed conversion. Hog production going from a 150 lb dressed carcass in 5-1/2 months on 600 lb of feed to a 175 lb carcass today in the same length of time and on the same amount of feed. The same general trend can be seen in other livestock and poultry groups. This has been made possible in a large part due to the combined efforts of research by government, universities, and agribusiness companies such as feed companies, breeding stock companies, drug companies, and so on. A real tribute should be paid to the tremendous results these combined efforts have shown.

In the area of financial planning there is no question that more help is available than ever before. Help with cash flows, profit projections, capital cost justifications, and capital attainment is available from government, universities, banks, and agribusiness companies. The farmer who goes ill prepared to apply for a loan today either has not asked for help in preparation or else his scheme is too far-fetched for anyone to bother with him.

When we come to (3) General management, however, the story is somewhat different. Do you ever stop and ask yourself why producer A can produce a broiler on a feed conversion of 1.80 while producer B, using the same chick, the same feed, and the same weight of bird, takes 2.10 lb of feed per lb of meat? Do you know of a hog producer who produces 20 weaner pigs per sow per year and another who produces 14 and puts his finished hogs to marked on 650 lb of feed versus 550 lb for the first producer? I know many of them in each category unfortunately, more in the later than the former.

In my opinion, one of the greatest needs in the agribusiness sector is help and advice on the general management by farmers of their operations. This is in no way a reflection on the management abilities of the majori-

ty of farm operators or on their knowledge of their business. But it is a well known fact that "It is not what we don't **know** that is our greatest profit robber but what we know but **don't do.**" It is not a case of knowing more about the hog business than the man raising the hogs. That can raise a lot of hackles, and rightly so. If you are part of the agribusiness community and are dealing with and interested in our earlier stated objective of efficient production of food, then not only can you help a producer towards this goal you also have a responsibility to do so. To continue this example, your overall knowledge of management principles in the hog business plus your objectivity of "looking at the forest rather than the trees" can be of immeasurable value to the hog producer, to your firm, and to yourself.

We all know that the consultant business is booming today. In more cases than not, the consultant's findings turn out to be rather obvious once we know them but they could not be seen due to overall involvement. Sometimes the findings provide that little extra conviction needed to make a tough decision. The field is wide open for the individual who has a genuine interest in upgrading efficiency levels in food production.

We now come to (4), which is "Adequate production records." In this case we are not necessarily talking about total financial records, P & L statements, and balance sheets, although these are certainly necessary. Most operations will have these records, if for no other reason than for income tax purposes. However, in many cases, while these records tell either the sad or the glad tale, they do not tell why. Relating to hogs again, a sow is, first of all, a sow. While total costs and returns may vary greatly — is she housed in a 10-year old facility that is fully depreciated and paid for or in a brand new facility at a cost of $2,000 per sow, on borrowed money at 18 per cent interest — the common denominator is that she should be producing 18-20 weaner pigs per year. If she is not, then in example 1 she is not returning to her owner what she should or in example 2 he is going broke. Production records and variable costs are the only ones that measure the true animal or bird efficiency of the operation.

Why are production records so imperative in the drive to attain stated agribusiness goals? Well, as we said earlier, improvements in production efficiency involve change. Farmers are resistant to change. Therefore, adequate records are a necessity for the producer to convince himself that the change he has made has been the right one — or the wrong one, for that matter, if the change was a poor decision. Another reason as to why accurate and complete production records are a necessity is that they are the only base from which to make meaningful management decisions. The agribusiness individual who is involved in some way in the production records of an operation can be an invaluable partner in helping to guide in management decisions.

OPPORTUNITIES AND CHALLENGES

This brings us back to the objective of this article: what are the opportunities in agribusiness, what are the challenges, and what should universities be doing to provide the skills and the motivation?

First, let me say that I believe the opportunities are great. I say this because of the needs of the marketplace as I see them and as outlined previously. Anywhere there is a need, there is a market.

The challenges to the individual to fill that need are somewhat more demanding and complex, however. Firstly, the successful candidate, especially if involved in sales or marketing, will have to be **aggressive.** Not pushy or a slick-talking salesman, but a leader who is willing to stand up for his stated beliefs and who is able to sell them. I said that progress involves change and change is hard to sell, especially if it is of "the pay now, benefit later" variety.

Secondly, to be a continued success and not a "flash in the pan," a candidate will have to be **dedicated.** Dedicated to the principal that if I am successful in producing a cheaper product and/or making my client more profit, my success will take care of itself. This relates back to the philosophy of the slower, more costly route paying bigger dividends in the end. This is not the easy way. It is not the way to the biggest paycheque in the shortest amount of time. I believe, however, that it is the way to success and to an inner sense of accomplishment.

Thirdly, the challenge to a candidate in this business is a **willingness to get involved.** None of the things we have discussed thus far will bear much fruit if it is simply "chin music." Getting involved means rolling up your sleeves. It means coming home at the end of a day with a good healthy odour of pig, or cow, or chicken on your clothes and in your hair. If you don't believe me, ask my wife. It means sometimes working with the producers of meat, milk, and eggs on his hours. It may mean sitting over a kitchen table helping with records, working on cash flows, preparing a prospectus for the bank. In any case, whatever it means, it means **work.** It will, however, pay big dividends. The competition gets much less severe when you get into this area. It pays dividends in terms of salary and earnings, if that is what you base success upon. It pays even bigger dividends in terms of personal satisfaction if seeing someone else successful, partly at least because of your efforts, turns you on. The combination of the two is pretty heady motivation for a career for the right person.

Last, what can the universities do? In a very few words — **TELL IT LIKE IT IS.** Don't paint a picture of utopia. It's a tough world out there! We all have a responsibility to the end products of the agribusiness community. Let's examine the real obstacles to more efficient production and equip our young candidates with the basic and fundamental knowledge in how and where to look for problems. Let's give more training in leadership. This means **selling,** not **telling!** Regardless of what branch of agribusiness you might end up in. I guarantee that if successful, you will end up "selling somebody something." It may be an idea to your boss or a product to a tough customer, but it is still selling and the same basic rules apply. More training in sales techniques would be usefull in any field.

As a final note to any budding agribusiness sales managers, marketing directors, or company presidents: it is a great business to be in. The field is unlimited. Nobody has yet found a substitute for food.

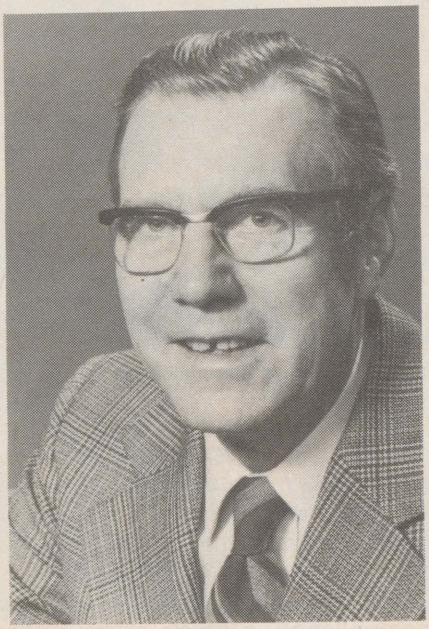
Biotechnology
Microbiology in the Space Age

by Professor Robert A. MacLeod
Department of Microbiology

"Biotechnology" like "satellite" and "computer" is a buzz word of the space age. What is biotechnology? In current terms it is the harnessing of microorganisms to provide products and services beneficial to mankind. Microorganisms, however, had been used by man for centuries before he knew they existed. Why then is biotechnology so much in vogue? The answer lies in the present level of sophistication of the science and the potential that it offers for the future.

The art of fermentation is very old. Before 6000 B.C. the Sumerians and Babylonians were making beer, and about 4000 B.C. the Egyptians were leavening bread, processes which depend upon yeast to produce alcohol and carbon dioxide respectively. Other fermentation processes which go back thousands of years include those in which acetic acid bacteria were cultivated to make vinegar, lactic acid bacteria were used to produce fermented milks such as yogurt, and various bacteria and moulds gave rise to cheese. No one knew how these processes, based on ancient empirical recipes, worked though many philosophical treatises were written about the nature of ferments and fermentation. In the 17th century a Dutch draper in Delft, Holland, by the name of Antonie van Leewenhoek, who ground lenses and made his own microscopes as a hobby, first saw the microorganisms in the microbial world. It was Louis Pásteur, however, in the middle of the 19th century who established clearly the biological nature of fermentation by showing that different microorganisms gave rise to different fermentation products.

The first industrial fermentation process was developed in Germany to produce glycerol for use in making explosives during World War I. The British blockade of German ports prevented the importation of vegetable oils, the usual raw material for glycerol. A German biochemist, Carl Neuberg, found that if bisulfite was added to an



alcoholic fermentation, glycerol production was favoured over alcohol. Facilities for producing 1000 tons of glycerol per month were quickly developed.

In 1928 Alexander Fleming noted that the mould *Penicillium notatum* killed his cultures of the bacterium *Staphylococcus aureus.* When the mould was grown in a liquid medium, the medium, after removal of the cells, was able to inhibit the growth of many species of bacteria. The active principal, penicillin, was isolated in pure form by British workers at Oxford University in time for World War II. This was the beginning of the antibiotic era. Subsequently many microorganisms have been discovered which produce antibiotics, and a whole range of these wonder drugs are now available. These compounds are unique and usually extremely complex. They are, for the most part, difficult or impossible to synthesize in the laboratory yet microorganisms can produce them in large quantities relatively cheaply in media prepared from waste animal and plant materials. Here, then, was the first really dramatic demonstration of one of the ways that microorganisms could be used to develop products of benefit to man.

Now microorganisms are used to produce a variety of commercially important products, such as the cells themselves. Most microbes divide by binary fission, that is, each cell grows to a certain size and divides into two daughter cells. This process can occur every 30 to 45 minutes. Thus in a growing culture the number of cells in the culture doubles over that which was present before every 30 to 45 minutes. The numbers of cells hence increase exponentially. If this process continued for 48 hours, the weight of cells produced starting with one cell would be many times the weight of the earth. What would protect us from being overwhelmed by this mass of microorganisms? The answer is the limit which exists in the availability of nutrients. As the mass of cells increases exponentially so the requirement for nutrients to allow more cells to grow increases exponentially, and the nutrient supply in any one environment quickly becomes exhausted. Although it is never fully realized, it is evident that microbes have an almost unlimited biosynthetic potential which if properly controlled and directed can be immensely useful for man. One of the ways it can be used is in the production of single cell protein. Microorganisms are grown in media prepared from various waste materials. The cells, which contain protein as a major component, are used directly as a supplement in animal feeds. Microbial cells are also used to bring about biological conversions. Microorganisms can carry out almost every kind of chemical reaction, and they do so at biological temperatures using water as a solvent. They thus have an advantage over non-biological chemical reactions in that they do not require the input of a great deal of energy in the form of heat and do not need organic solvents. Microorganisms carry out

heir reactions with the aid of bio-atalysts known as enzymes. These nzymes have a high degree of speci-city and can produce one kind of olecule in high yield and in a very ure form. One example of the way the harmaceutical industry has used bio-gical transformations is in the pro-uction of steroids.

Enzymes are important in the food nd chemical industries. They have ng been derived from plants and nimals. Enzyme production by micro-rganisms is increasing rapidly. licrobially produced amylases are be-g used in brewing, baking, and the anufacture of textiles. Rennin from icrobes is now used in cheese-aking. The combined action of three icrobial enzymes is being used to nvert corn starch to fructose, giving se to a sweetening agent much weeter than sugar.

In the past the microorganisms sed to prepare these various prod-cts were obtained from natural urces in large scale screening pro-ams. This was a laborious procedure which many hundreds and even ousands of microorganisms were sted to determine whether they could oduce a particular product. If such n organism was found, it was then eated with a mutagenic agent, an gent such as ultra-violet light, which ould modify the genetic make-up of e organism and hopefully permit the lection from among the mutants pro-duced of one or more organisms with an enhanced capacity to produce the desired product.

What is now causing all the excitement in the field of biotechnology is the fact that basic research in molecular genetics has revealed that by direct intervention one can engineer genetic changes in cells. Bacteria contain a single circular chromosome composed of deoxyribonucleic acid (DNA) which contains most of the genes which code for the proteins produced by the cell. Many of these proteins are enzymes which are required for the biosynthesis of compounds produced by the cells. In some bacteria genes are also found in extrachromosomal elements called plasmids. These are small circles of DNA found in the cytoplasm. The genes in these plasmids also code for proteins. What has been discovered is that one can open the plasmid circle with an appropriate enzyme, splice in genes from other sources, close the circle again and have the new genes expressed in the cells. By a process referred to as gene amplification one can greatly increase the number of copies of the plasmid in the cell. This increases to very high levels the manufacture of the protein for which the newly introduced gene or genes code. If one introduces into the plasmid the gene from animal cells coding for the protein insulin, then a large population of bacterial cells containing the amplified plasmids should be able to manufacture large quantities of insulin. This has, in fact, been shown to happen and it is expected that insulin produced by microorganisms will soon be available commercially. Theoretically any gene or combination of genes coding for the enzymes involved in the synthesis of a desired product should give rise to that product if the genes are spliced into a suitable plasmid, and the plasmid genes are expressed in a population of microbial cells. It does not always happen, however, apparently because we do not yet know or understand all the control mechanisms operating in many of these processes. Because of the huge monetary rewards which would be forthcoming to people who could develop methods of producing expensive pharmaceuticals cheaply using bacteria, tremendous sums of money are currently being invested in basic research designed to make these processes work. Never has it been more clear that basic research into the mechanisms of life processes can pay off in terms that the real world understands.

"Never has it been more clear that basic research into the mechanisms of life processes can pay off in terms that the real world understands."

How can genetic engineering and molecular biology help agriculture? It has been known since Roman times that legumes such as peas, clover, and alfalfa enhance the fertility of soil. Soil from fields where legumes had been planted was added to fields where legumes were to be grown for the first time. The Romans did not know that the effects they observed were due to the presence of bacteria of the genus *Rhizobium* which infect the roots of legumes causing nodule formation. In the nodules the bacteria derive nutrients from the plant and, in turn, by a process referred to as nitrogen fixation convert nitrogen gas in the atmosphere to ammonia, a form of nitrogen which the plant can use. What the Romans were doing was supplying a population of *Rhizobia* to infect plants in new fields of legumes. Also, because fixed nitrogen left in the soil by a crop of legumes can be taken up by grain, plants which do not form nodules, the enhanced fertility of the soil led to the now traditional practice of crop rotation. In 1888 *Rhizobium* was isolated by German investigators and within a very few years soil was being deliberately inoculated with cultures of the bacterium. The ques-

(Continued on page 39)

Summer Research

This past summer two School of Food Science students received NSERC (Natural Sciences and Engineering Research Council) INDUSTRIAL SUMMER RESEARCH AWARDS. This program requires the student to apply to the federal government agency in collaboration with the company.

For the second summer, HELENA ROZANKOVIC, Food Science Major, was sponsored by Catelli Limited to work with the Research and Development lab to develop evaluation methods for raw peas and to determine consistency variation of cooked peas.

JEROME COUTURE, Food Chemistry Major, worked at Agropur in Granby on a research project to determine suitable analytical methods to measure the activity of proteolytic enzymes secreted by psychrophylic bacteria present in raw milk when it is stored at low temperatures for a few days.

Seeking Solutions

As any Scotsman knows, oats are an excellent source of dietary fibre and yield a protein content of up to 22 per cent. However, as **Karen Lapsley** of the School of Food Science points out, only about five per cent of the North American oat crop is milled for human food. Canadians do not consume this cereal in significant quantities as compared with wheat and corn based products, yet there are many oat constituents that have potential use in the food industry. The complex carbohydrates or dietary fibre components have yet to be examined in detail. It is also known that gum or polyglucans portion is significant and, if extracted, could be a potential food additive. Ms. Lapsley hopes to study the dietary fibre components of oats and especially the oat gums. Her work is being supported by the Dean's Discretionary Research Fund and should yield information on oat constituents as food additives. Who knows, there may be more to oats than cookies and porridge for Canadians!

A new method for the control of aphids in greenhouses is being studied by **Professor Stuart Hill** of the Department of Entomology. Professor Hill hopes to select a line of midges *(Aphidoletes aphidimyza* [*Rond*]*)* that could serve as a predator for aphids.

The midge is an important predator of aphids in all habitats where it is found. Early work has shown that *Aphidoletes* is useful because of its short life cycle (21 days at 20°C) and its capacity to control a wide variety of species of aphid. Unfortunately, during short days in winter *Aphidoletes* tends to enter into an inactive phase and this reduces its value as a control organism.

Professor Hill and his graduate student, **Linda Gilkeson,** hope to select genetically a population that could continue to act as a predator in greenhouses throughout the winter. The use of such biological controls will help to reduce the problems of insecticide residues in human food and even reduce costs of production.

The commercial value of greenhouse production in Canada has been estimated in 1976 to be over 20 million dollars. The increased yields from this method of control would be a dramatic way of combatting some of the increased costs now associated with high-energy requirements of greenhouse food production.

Several million dollars per year are lost in Quebec alone due to porcine pleuropneumonia caused by *Haemophilus pleuropneumoniae.* According to **Professor D.F. Niven** of the Department of Microbiology, the identification and purification of the harmful materials from these organisms would allow the development of more effective vaccines. This is possible because only a few antigenic components would have to be incorporated in the vaccine making it much more efficient. Initially Professor Niven hopes to isolate and identify sufficient quantities of the purified haemolysin so that it may be examined for leucocidin and cytotoxin activities. With this research the development of an effective vaccine would be one step closer for Quebec farmers. Benefits could be enormous.

Intensive animal production in Quebec has led to a major problem in manure management. Storage facilities for a period of at least 200 days are now specified by the Quebec Ministry of the Environment. According to **Professor Pierre Jutras** of the Department of Agricultural Engineering, the costs of these facilities can be staggering. Professor Jutras feels that costs could be reduced if earth replaced concrete in the construction of manure storage facilities. His research, which began in 1981, may answer some of the vexing problems that still remain. If manure is stored in facilities constructed of earth, is there a cost to the environment in terms of loss of nitrates, organic matter, and other pollutants to the adjacent ground water?

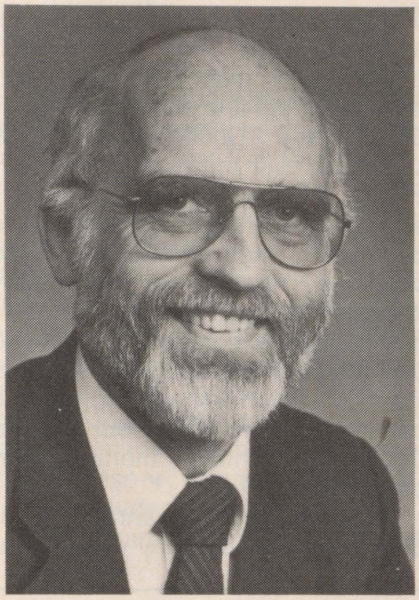
Four small lagoons have been built in soils ranging from sand to clay. Results of this study should give Quebec farmers and the Ministry of the Environment solid information on the efficiency and value of lagoons constructed from readily available cheap soil materials.

The Quebec Ministry of Agriculture has set up a new research program to allow researchers in the province to compare crop varieties, vegetable varieties, and herbicides on a continuing basis. This is included in the government's "Testing" program. **Professor Harold Klinck** received $100,000 for 1982-83 for cereal, corn and oilseed crop trials, **Professor Alan Watson** is carrying out herbicide evaluations, **Professor Bruce Coulman** is carrying out forage production testing and **Professor Katrine Stewart** vegetable variety comparisons. These studies, all carried out in the Department of Plant Science, form part of a province-wide network designed to determine the relative productivities of crops and relative efficiencies of herbicide control treatments. Results will allow Quebec producers to pinpoint varieties and cultural treatments that will give optimum yields.

Cheese anyone? **Professor Ng-Kwai-Hang** of the Department of Animal Science is looking into milk protein content and the composition and yield of cheese. Consumer demand for foods low in fat and high in protein has led to increasing interest in proteins and suggestions to include protein in the milk pricing formula. However, Professor Ng-Kwai-Hang notes that the composition as well as the content of proteins in milk is important because in determining the yield and quality of cheese, he feels that if the relative value of protein can be established, then a milk pricing system could be determined which would be compatible with consumer and processor demands. Using samples from the Dairy Herd Analysis Service, the effects of environment, health status, nutrition, and genetics on milk protein content will be assessed. Ultimately, it should be possible to determine if pedigree, date of calving, and nutritional intake effect the composition and quality of cheese.

RESEARCH AT MACDONALD

by Dr. A.F. MacKenzie
Associate Dean, Research



Research has always been a high priority activity on the Macdonald Campus in the Faculty of Agriculture and School of Food Science, but the value of our research activity depends on your viewpoint. The academic staff view it as a creative activity in which their imaginations can soar, not to mention the promotions that result from publication of research findings. Graduate students probably view research as an end in itself, allowing them to create a micro environment in which they can devote their full energies away from the problems of the world. Or perhaps it is a means to an end, the means by which students can obtain their postgraduate degrees and subsequent employment. Undergraduate students often view research activities of the professors as something that keeps them away from students or that interferes with lecture preparation. To the public at large? To some we are ivory tower residents in white coats caught up in useless academic rigamarole; to others we are people who supply answers to problems.

However you look at it, research is a complex business. We have over 300 funded research projects actively in progress, over $3 million per year in research funding, and close to 200 graduate students.

Prior to the 1950s, the early research done at Macdonald seems to have been financed from Faculty budgets; University technicians involved in the research were funded from Department budgets. Students obtained scholarships from various sources or from private funds and research tended to be of a very basic nature. Some contract work was carried out in nutrition studies but in most cases the research was carried out with the facilities available, with the funding available, and with a fairly constant turnover of graduate students in the process.

With research now requiring more sophisticated equipment, better trained technicians, and more elaborate laboratory facilities, the cost of research has increased enormously. Staff have had to go to outside agencies to obtain money to support this research. Other research centres and universities have also found the same increased money requirement. As a result, the competition for the research dollar has become severe. A whole new area of expertise — grantsmanship — has evolved, and researchers find they are spending more and more time looking for funds and less and less time in the actual research process.

How has Macdonald faired in this very competitive and increasingly complex world of grantsmanship, of constant search for research money, of conflicting requirements on people, and of demands from the public at large for more relevant research?

Let's look first at our graduate student enrolment at Mac — these are the people that do most of the work, that carry out the myriad of tedious measurements in the laboratory, that create the conclusions that are presented in their theses. In 1981-82 we had 190 graduate students on the campus, down slightly from our high point of 205 in 1977-78 but up significantly from the 176 students in 1979-80. This enrolment places us third in agricultural faculties in Canada, after the University of Guelph and the University of Manitoba. However, we are probably not near our upper limit of about 270 to 300 students, based on four graduate students per academic staff member. To reach this new level will require significantly increased funds, and students may find themselves working in restricted laboratory space.

Source of funds

Where are the research funds coming from that support the present activities, and are increased funds going to become available? In 1981-82 we received about $3,250,000 for research. The largest donor was the Federal Government which awarded about $1,300,000 in grants and contracts. Over $700,000 was received from Provincial Government departments and about $510,000 came from industry. Federally funded work overseas through the Canadian International Development Agency (CIDA) amounted to about $768,000.

Provincial funding took a leap in 1981-82 compared to earlier years, largely from the Conseil de Recherche et Service Agricole de Québec (CRSAQ) ($660,000) and the Ministry of Education's funds for Formation de Chercheurs et Action Concertée (FCAC) (40,000).

CRSAQ has always supported production-oriented agricultural research: new cultivars; new management techniques for soils, crops, and animals; fertilizer, weed, and insect control; nutrition; genetics, and economic assessments. Much of the CRSAQ work is aimed at solving immediate problems faced by the farmer. Projects are for a maximum of three years, thus long term studies are difficult with CRSAQ funds.

FCAC, on the other hand, supports more fundamental research. Our FCAC projects have been based on finding new knowledge about the biological milieu in which we live: ecology of water environments, nitrogen fixation, basic properties of milk proteins, etc., are some examples.

Federal funding has also increased in 1981-82 dramatically over funding of 1980-81. Federal money comes primarily from Agriculture Canada and the Natural Science and Engineering

Research Council (NSERC). Our increase from Agriculture Canada has been primarily in the area of contracts. It would seem that the Federal Department of Agriculture is beginning to realize that universities are an excellent place in which to farm-out research projects. As with CRSAQ, the funding from the Federal Department of Agriculture tends to be a production oriented type, dealing with crops, animals, and soils as they effect the farmer and his farm gate receipts.

NSERC funds are vital for basic research in biology. They are a major source of funding for research in the Departments of Microbiology and Entomology and form significant parts of research in Animal Science and Plant Science.

Relative to other faculties of agriculture in Canada, Macdonald has done well with Agriculture Canada; in 1980-81 we were third amongs eight other faculties indicating our potential for production research. In NSERC grants the Faculty was sixth among eight faculties of agriculture, and this may reflect our staff orientation — our big departments are mainly production oriented, i.e., Plant Science, Animal Science, Agricultural Engineering.

Research funded by Environment Canada seems to be decreasing after the peak years of 1979-80 and 1980-81. Whether this is a trend or simply the usual variation remains to be seen. After an absence of three years, Macdonald is again receiving funds from the Medical Research Council, which is encouraging. Together they totalled about $50,000 in 1981-82. Surprisingly, the National Capitol Commission finances $139,000 in contract work in the Faculty, primarily through the Department of Agricultural Engineering.

Are we missing the boat in many Federal agencies which we have not touched? For instance, International Trade and Commerce, National Health and Welfare, Energy Mines and Resources, National Research Council?

Industrial Funding

Industrial funding is one area that is also bright in that our funding is increasing spectacularly from around $100,000 to $175,000 per year (in 1976 to 1980), to around $410,000 in 1980-81, and $478,000 in 1981-82. Last year chemical companies were the major source with about $225,000. Food and feed companies were next with $134,000, energy companies (Hydro Québec, etc.) $43,000, animal and crop breeders' associations, $35,000 with machinery and equipment suppliers and pesticide people at $29,000 and $12,000 each. One can speculate over the reason for this increase. Is it related to the down-turn in economic activity, with companies decreasing their in-house research spending? Are companies beginning to realize they can contract for work at costs that are competitive with their own research establishments? Or are industry personnel realizing that they can make an input into our research through the contracts method — and be assured of results?

These obvious advantages to industry are also in many ways advantages to our researchers who find that liaison with industry people can give access to better methods and better equipment.

The efforts of the office of Industrial Research at McGill have helped to promote this liaison between industry and academia.

Many staff view research contracts with a certain amount of concern. Do they violate academic freedom? Does the direct input of industry people into the research reduce the creativity and flexibility so prized by researchers? Is the overhead charged by the University taking money away that would otherwise go to the researchers? These fears are counterbalanced by the advantages of contract funding: salaries for technicians and graduate students, travel funds, and funds for new equipment and improvement of laboratory facilities. It would seem that other universities have realized these

NEW VISITORS' CENTRE, MORGAN ARBORETUM

by Professor A.R.C. Jones
Woodland Resources
Department of Renewable Resources

Within the context of Consolidated-Bathurst's 50th Anniversary program the company has agreed to fund the establishment of a Visitors' Centre at the entrance to the Morgan Arboretum, Macdonald Campus of McGill University. The purpose of the centre would be as:

(a) a repository of natural science literature and of information on the Arboretum and Association activities and projects;
(b) a source of much needed income, as a weekend sales outlet for memberships, souvenirs, and products produced on the property such as maple syrup, Christmas trees, and plants;
(c) a congenial environment for increased volunteer staff participation and a focus for encouraging active membership involvement.

Since its establishment in 1947 the Arboretum has been developed into an effective demonstration of forest resource management, conservation, and multiple use. It covers 530 acres of woodland and contains 45 native tree species and over 100 exotic species in special collections. It is the only forestry tract readily accessible to Montrealers. The Centre will come from an "A-frame" building now on the downtown McGill campus. This is being dismantled and its components will provide the main structure for the new Centre. With the Centre and the Gatehouse at the main gate, effective control of access to the property will be assured. The project will also improve the ability of the Association to communicate its message on the forest's needs, life, and value. All units will be constructed in a manner to reflect credit to the institution and Consolidated-Bathurst.

The project will bear witness to the Company's desire to promote public awareness of the importance of forest conservation and support a valued local forest resource.

dvantages as well. In 1980-81 the aculty stood fourth in industrial con- acts after the Faculties of Agriculture t the Universities of Guelph, Saskat- ewan, and British Columbia. Surely is is an area where we can expand ur efforts. Industry will have to be ade aware of our many capabilities research in food production, pro- essing, and distribution.

In overseas contracts funded by ederal money, i.e., by the Canadian nternational Development Agency CIDA), Macdonald has been first mong Canadian agricultural faculties r the past six years. This is entirely e result of the Sugarcane Feed esearch Centre conceived by Pro- essor Eugene Donefer of the Depart- ent of Animal Science and placed in peration in Trinidad. Although this acility and the work involved with it as now been turned over to the gov- rnment of Trinidad and the Universi- ty of the West Indies, Macdonald still plays a significant role in providing expertise for the many requirements of the Centre.

How does our Faculty compare within McGill University as to research funding? Our research awards — grants, contracts, and fellowships — for 1981-82 were about $50,000 per full time academic staff (including Assistant, Associate, and Full Professors), very similar to the Faculties of Engineering and Science, and greater than all other Faculties. Our teaching budget was about $66,000 per staff. Thus our total research awards budget is approaching that of our teaching budget. This certainly indicates that the Faculty of Agriculture and the School of food Science is carrying out a significant role within McGill University in research and training of graduate students.

So what can be conclude from this maze of interwoven threads between research funding, professors, students, and society? In many respects we are slaves or prisoners of our research funding resources. Our research is confined within the limits and priorities of the granting agencies and contract support. This may be good in that it makes us work on real problems of concern to a wide spectrum of society. It can be a problem in that it limits speculative work — it is very hard to get funding for the "off the wall" type of research that can from time to time lead to significant advances.

Funding seems to be slowing down in the area of environment and biological agriculture. The public at large and the agencies in particular seem to have put the environment in limbo until production problems and the economy are straightened around. We have some gaps in our research. An example is biotechnology — the new glamour child of the research establishment. Although we have practiced biotechnology in production of new varieties of crops or in biological control for weeds, we have not yet moved in a large way into biotechnology. *The New York Times* in a recent scientific supplement on biotechnology stated that the need was for graduates at the technical level, not for highly trained Ph.D.'s. The Department of Microbiology has recognized this and is planning an undergraduate course to help prepare students for a career in biotechnology.

Finally, we must avoid the idea that problems can be solved simply by throwing money at them. More research dollars does not necessarily mean more research findings of a significant nature. We need to have a stimulating psychological environment and a pleasant physical environment in which to carry out our research. Is this possible in a era of shrinking budgets, reduced staff, and increased teaching loads? In the flurry of research application deadlines, in the harried consultations with intense industry researchers, in the bleak discussions with Accounting about overspent grants, we must not lose track of our primary goals — research to provide a better basis for the agriculture and food industry with minimum impact on our fragile environment.

unding of teaching and research ctivities 1981-82

culty	Full Time Profs.	Teaching Budget[1]		Research Awards[2]		Average expenditure in $000 per staff Teaching	Research	Res. $ Teach $
	no.	*$000*	*(%)*	*$000*	*(%)*			
griculture	67	4,422	(5.5)	3,350	(6.0)	66	50	0.7
rts	211	12,768	(15.9)	2,304	(4.1)	60	10	0.2
entistry	23	1,922	(2.4)	160	(0.3)	83	6	0.1
ducation	123	7,363	(9.2)	508	(0.9)	59	4	0.1
ngineering	120	8,730	(10.9)	6,979	(12.5)	72	58	0.8
aw	24	1,866	(2.3)	515	(0.9)	77	21	0.3
anagement	50	4,009	(5.0)	364	(0.7)	80	7	0.1
edicine[3]	626	19,524	(24.3)	27,066	(48.3)	31	43	1.4
ience	216	14,017	(17.5)	12,240	(21.9)	65	56	0.9
thers[4]	83	5,680	(7.0)	2,421	(4.4)	68	29	0.4
otal	1,543	80,391	(100.0)	56,012	(100.0)			
VERAGE						52	36	0.7

Teaching budget represents base operating budget of Faculty.
Research awards include grants, contracts, and fellowships to staff and students. The 81/82 total $56 million compares with $48.1 in 80/81 (+ 16.4%). The comparable 81/82 increase in the teaching budget was 7.9% — up from $74.5 million in 80/81.
No. of professors in Medicine includes 462 Geographical full-time appointments.
Others include small Faculties (Music, Religious Studies) graduate schools, institutes, and centres.

P.S.

Dear Readers:

In searching for an appropriate heading for a page devoted to you the reader — your thoughts, opinions, and suggestions — I browsed through various publications for ideas. I remembered the post mark idea used on the Voice of the Farm page in the old Family Herald and dug out the last issue. I was editor of that page for several years and remembered choosing the towns to be used in the design. Certainly the letters and subscriptions received after publication of the August issue of the Journal would give us variety. The first subscription in as a result of the "new look" Journal came from an '80s graduate who lives in Dollard des Ormeaux, just a few miles from Macdonald. Since then we've heard from Ormstown, Ste-Foy, Sherbrooke, Montreal, Mont Ste-Hilaire, Harrington Harbour, Arundel, and other towns and cities in Quebec. To date, we've also received subscriptions from Berwick and Truro, Nova Scotia, Brooks and Edmonton, Alberta, Saint John, New Brunswick, Ottawa, Stouffville, and Barrie, Ont., and Sidney, B.C. The Journal will also be travelling to two areas in California (one is for a graduate of 1912) and one in Colorado as well as to Nigeria, Barbados, and Holland . From past subscriptions I have realized that graduates "get around." I'm realizing this more and more each day.

It was elsewhere in that last issue of the Family Herald that I found the idea for the new head. In the very popular column "Chapman's Corners" Lyman T. Chapman mentioned that the short P.S. he wrote at the end of each column was "the feature that caught the fancy of many readers."

Why not head the page "PS" for not only do we receive letters, we also receive many short notes — PSs — along with the main reason for writing: requests for changes of address, for renewals, and for new subscriptions.

In the mailbag since the August issue has also been news from graduates which you will find in the Newsmakers section. Please keep the news and views coming.

Hazel M. Clarke
Editor.

P.S. Mail reaches my desk at 11 a.m. The letter opener is handy and waiting.

A Dynamic Effort

Congratulations for the last issue of the Macdonald Journal. . . a very dynamic effort.

L. Lachance, M.Sc. (Agr.) '56
Ste-Foy, Que.

Job Well Done

With respect to the new format of the Macdonald Journal, I would like to congratulate you on a job well done. A couple of pages at the end of each Journal dedicated to alumni present whereabouts may enhance the Journal circulation.

Good Luck!

Medhi Abdelwahab, B.Sc. (Agr.) '74, M.Sc. (Agr.) '79.
Beaconsfield, Que.

(Check the Newsmakers section, Medhi.)

Interesting Reading Experience

The new version of the Macdonald Journal has just arrived. It is an excellent publication with interesting reports, good layout and design, and sufficient content to make the Journal an interesting reading experience.

Please pass my compliments on the new Journal to Hazel Clarke and the Publications Committee.

Mark W. Waldron, Dip. Agr. '55, B.Sc. (Agr.) '59
Guelph, Ont.

(It was particularly pleasing to hear from Dr. Waldron as he was Editor of the Journal for many years.)

All Comments Favourable

Congratulations on the new version of the Journal. Graduation issue is of special interest coupled with the reminiscences of college life. The articles on agriculture and food science by Dr. LeRoux of Agriculture Canada and by the Macdonald staff will be helpful to our Women's Institute members in their Producer-Consumer Awareness program.

I appreciate the new features, as well as the attractive cover and the interesting introduction to the articles in the table of contents. So far, all comments that I have heard have been favourable.

Good luck with future issues.

Mrs. Sterling Parker,
Teacher's Diploma '39,
President, Quebec Women's Institutes

New Format

I like the new format of the Journal.

Walter A. Humphreys, B.Sc. (Agr.) '35
Barrie, Ont.

(For news of Mr. Humphreys, see Newsmakers section.)

Evokes the Very Spirit of the Macdonald Community

May I offer my congratulations to you as editor of the new Macdonald Journal.

You have achieved a publication which evokes the very spirit of the Macdonald community. It is as friendly as a chat among old friends who meet after years of separation. It gives welcome news of people we know and people we knew; and it reports the work of Macdonald and the research done there, important information for the public.

I look forward with anticipated pleasure to future issues.

Marjorie M. Jenkins

(Professor Textile Science [retired].)

Good Style and Content

Excellent new publication. Keep up the good style and content.

John Ogilvie, B.Sc. (Agr.)'54,
Guelph, Ont.

Getting All That News!

I wanted to write and tell you how much we enjoyed the new format of the Macdonald Journal. It was most enjoyable getting all that news of Mac in the one issue.

Allan Crawford, B.Sc. (Agr.)'50,
Mississauga, Ont.

COMPUTERS IN AGRICULTURE

by Professor P.J. Jutras
Department of Agricultural Engineering

The use of computers, particularly the so-called microcomputers, continues to grow. Some provinces have established or are establishing computer networks for their agricultural extension services. Agricultural colleges and universities are offering computer courses to students, and a spin-off from these courses is that programs for these have had to be developed for various agricultural disciplines. These programs are of the tutorial type and are very useful to the general farm public.

Several seminars have been held across the country to introduce the use of microcomputers to the farm public. Economists at the University of Saskatchewan are spending considerable time and effort in writing or converting programs for farm management. These are to be used on microcomputers mainly by farm operators and extension personnel. More programs are needed. On-farm computer use will continue to mushroom in the next decade. To fill the demand, all types of programs should be made available by federal or provincial departments of agriculture. If this does not occur at a fast enough rate, inferior products may be peddled by software salesmen, and this may destroy much of the credibility of computerized management aids.

The importance of computers in agriculture led the Ordre des Agronomes to give this theme a priority at their annual meeting this year. Hosted by the Ste-Anne-de-Bellevue section of the Ordre, the meeting included discussions and field trips depicting the various uses of computers in agriculture. We have chosen to reproduce in this issue, in condensed form, some of the texts from the conference. An interesting field trip during the conference was a visit to the farm of Roger Dubuc and his brothers of St-Isidore (near Montreal). The brothers operate a 220-head Holstein farm and, using a program developed by Roger, a computer is used to analyse the feeding requirements of each cow and to mix the feed in such a way as to meet the needs of various groups of cows within the herd.

This issue also brings to you condensed versions of articles that have appeared in various Canadian agricultural publications, and we are indebted to the authors and to the publications in question for the valuable contents.

If after reading the various articles on computers you should decide to purchase your own microcomputer, be it for farm use, for research, or for extension, we would recommend that you first consider having your name placed on the mailing list of an excellent publication edited by R.W. Ross entitled:

Agricultural Microcomputing Newsletter
Farm Economics Section
Ridgetown College of Agricultural Technology
Ridgetown, Ont. N0P 2C0

No report dealing with the use of computers in agriculture would be complete without the mention of Dairy Herd Analysis Services, and for this we have chosen to condense a conference report by Jacques Jalbert. Dr. John Moxley of Macdonald introduced this comprehensive milk recording program in Quebec in 1966, and it has grown to a point where over 300,000 records are processed each month, a feat that would be impossible without the use of the computer!

A Short Guide to Computer Jargon

by Professor Robert Kok
Department of Agricultural Engineering

To assist you in understanding some of the terminology used not only in the following articles but also in others dealing with computers, we have put together the following brief explanations for some of the more frequently used terms.

Microcomputer, minicomputer, main frame

Computers come in various sizes to perform various functions. The above might be respectively compared to a personal car, a pickup truck, and a semi-trailer.

Hardware, software, firmware

Hardware is the physically recognizable part of the computer. This includes items such as the keyboards. CRT's, circuit boards, printers, floopy disk drivers, and so on. This is the computer's body.

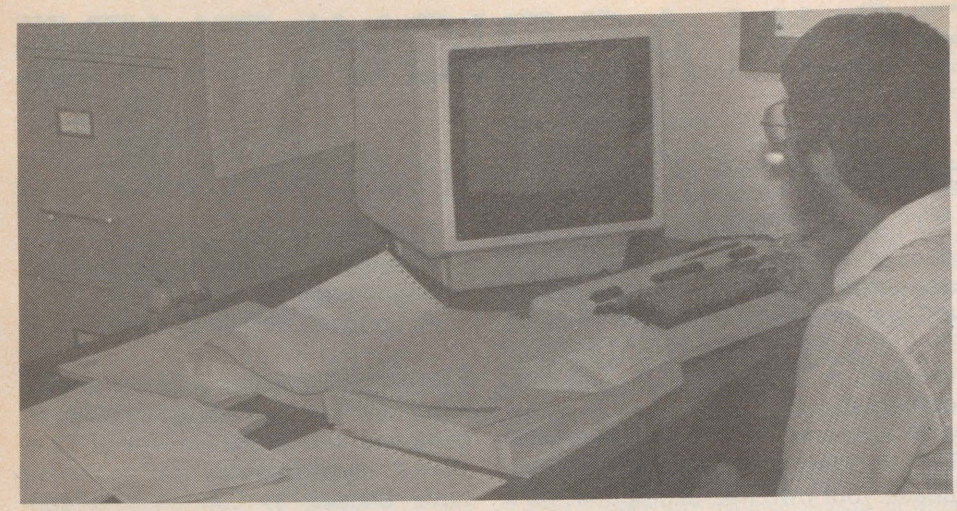
Software consists of sets of instructions (programs) to the computer. These determine what the computer does; by means of feeding such instruction sets (programs) into the computer, you can make it do what you want. Software can be bought, sold, traded, stolen, or given away in many forms; it might be printed on paper, punched into cardboard cards, recorded on magnetic tape, or merely exist as a set of electrical impulses travelling down a wire.

Firmware is software which is definitely associated with a particular piece of hardware. Very often the software is encoded in a chip. When you buy such a chip, you buy a piece of hardware with the software inside it — therefore, firmware.

Some microcomputer components

A **microcompressor** is an electronic component which contains a large number of interacting circuits. When you open up your microcomputer to have a look inside, find the largest chip. That is usually the microprocessor.

Circuit board: most of the computer's electronic components are mounted on circuit boards. Usually, these can be easily detached from the computer and reinstalled. To increase the memory of the



Gaetan Campeau, a programmer with DHAS, works with some of the tools of the trade: directly in front of him are two examples of hardware — a keyboard and, remarkably similar to a television, a CRT.

machine, for example, you basically must buy an extra circuit board on which is mounted a number of memory chips. Frequently such a board can be installed by slipping it into a connecter which is already present in your computer.

Keyboard: an arrangement of keys (basically push buttons of some type) as found on a typewritter. It can be used to "input" information, i.e., to talk to the computer.

(CRT): Cathode-Ray Tube. This is an "output" device. On it, the computer can display information for you to read. The computer talks to you. With most microcomputers you can use your home television in this way.

Printer: Another output device. A printer will, however, print on paper, i.e., it produces hardcopy. The advantage of a printer is that you can look at the output later; a disadvantage is that you can use up a great deal of paper in a very short time. A CRT has exactly the opposite attributes.

Tapes, floppy disks, hard disks

These are information storage devices. You can store either programs (information sets) or data on them. These are all magnetic media. Tapes are long ribbons which are wound up and disks are circular plates which rotate. Due to the physical structure of these media, it is a lot easier to retrieve information from any place on a disk than from a tape. Disks are, therefore, much faster to operate. Disk drives are, however, much more expensive than small tape recorders. A floppy disk is a small disk (5.5 and 8-inch diameter are common) which can be bought for about $10. These can be easily inserted into and removed from a floppy disk drive. At present the amount of information that can be stored on a floppy disk is quite limited. A hard disk is a disk drive with a built-in disk which remains permanently in the drive. These can be quite expensive but can hold a lot of information.

Basic, Fortram, Pascal

These are computer languages. Most microcomputers understand BASIC, but for many computers you can buy software packages that allow them to be programmed in other languages as well. There are quite a variety of computer languages available. You obviously must learn a language before you can use it to program (i.e., to instruct the computer).

Host computer, stand alone home computer

In many instances computers can talk to each other (transfer information). Many small, independent computers which are capable of operating all by themselves (stand alone home computer) can also be hooked up as "remote terminals" to a larger computer via your telephone. Your microcomputer thus becomes a "slave"; the larger machine is then called a "host computer."

Portable Data Entry Terminal (PDET)

This is a piece of equipment into which data can be entered via a small keyboard. It then remembers these data and later transmites them to your microcomputer or to a host computer. Data such as milk yield, fowl weight, plant height, and so on might be recorded on it.

Intelligent, user-friendly interface

This is a very sophisticated type of program which makes it considerably easier for you to interact with your computer. It allows you to concentrate on your business and not on the computer; it makes the computer behave as if it were human. That is, it checks your answers, it interprets your questions, it asks you for data, it warns you of impending problems. At Macdonald we are currently writing such a package for farm operation and management; we are trying to create a farmer-oriented computer rather than computer-oriented farmers.

The following is condensed from an article which appeared in the Spring 1982 edition of *Agrologist* entitled **"Computers in Education: An Exciting Challenge,"** by L.R. Schaeffer, who is with the Department of Animal and Poultry Science at the University of Guelph.

"Computers have been used in universities for research purposes since the early 1960s and have become an essential tool.

"With increasing computer literacy on the part of students and encouragement of faculty, wider use of the university's mainframe computer has been made in undergraduate courses. The computer has not only allowed students to solve problems more quickly, but it has allowed professors to broaden the scope of problems to let students explore various alternatives.

"Simulation programs have also been enthusiastically accepted by students. An example is one in animal breeding where students are made the managers of an imaginary beef herd. The students must outline a selection and breeding program, follow it for several generations and manage all financial aspects of the herd as well. Within one week a student can try out several breeding programs, each of which would take decades to accomplish in real life. Simulation programs can tie together material from many courses such as nutrition, breeding, physiology, economics, health, and engineering.

The personal microcomputer is bringing about radical change in all disciplines, including agriculture. Students should have an opportunity to "test drive" several microcomputer systems as part of a course on production systems in dairy, beef, swine, or poultry. We do not need to sit back and wonder whether or not computers will have an impact on education because they already have.

"The future will likely see the role of university educators expanded to include our involvement in mass information systems, such as the Canadian Telidon system. The entire university will become a general source of infor-

mation that virtually anyone will be able to access through their home televisions. Our audience will not be restricted to a classroom, but will go beyond the university. All of this will be a big challenge, but truly a very exciting challenge.

The following is also condensed from an article from the Spring 1982 edition of the *Agrologist* entitled **"Computers in Agricultural Research: An Unlimited Future,"** by G. Poushinsky, who is with the Engineering and Statistical Research Institute, Ottawa.

"A technician sits at his desk, laboriously calculating all 190 correlations for 20 variables. Pedigree information is maintained for 3,600 cultivars in a massive loose leaf file. When pedigree information is added, a researcher spends hours crosschecking and updating.

"These two pictures no longer hold true. Computers have eliminated much of the repetitive labour.The effect of computers on agricultural research has already been enormous; what lies ahead will be no less revolutionary.

First we have the desk top calculator; portable, perhaps programmable, increasingly sophisticated, but of fairly limited capability. Every researcher (and technician) has one of these; what is now happening is that researchers have increasing access to a special version of the desk calculator, the portable data entry terminal (PDET). Also, in this area, which may be termed primary data collection and analysis, is the microcomputer. These are put to a variety of uses — data collection and analysis, special purpose functions, data entry, and transmission, etc.

"These primary and limited tools are often interfaced to computers of the second level of sophistication.

"For even more computing power, several establishments also have ties with local computing services and universities. Thus, researchers have access to a broad spectrum of computing power.

"The above only touched on the sum total of what computers are used for in research. Suffice it to say that more agricultural research is being carried out in a more efficient manner because of computers.

"The potential uses of computers in research are almost boundless . . . The gains to be realized from these efforts in terms of improved productivity and efficiency will more than offset the short-term costs.

The following is a combination of two articles. One is called **"Computers in Extension: Present and Future Uses,"** by R.E. Forbes from the Spring 1982 edition of the *Agrologist;* the other is **"Microcomputers in Extension,"** by J.H. Nodwell. Mr. Forbes is a transportion specialist with the Manitoba Agriculture Department in Brandon and Mr. Nodwell is Associate Director of the Agricultural Representatives Branch, Ontario Ministry of Agriculture and Food in Toronto.

"Information is by far the most important farm input, yet it is often obtained in bits and pieces to be fitted together without pattern or plan. Over the years, producers have sought information on production and marketing through various sources: letters, farm magazines, extension services, meetings, radio, and television. With the current breakthrough in communication processes combined with computers, it should be possible not only for producers to have ready access to good information but it should be possible to use sophisticated electronic aids in customizing this information for the individual producer's use. This is what can happen — what will happen is largely up to Canadian agrologists. The hardware is available but the programming leaves much to be desired. It seems that we are all so busy doing our daily chores that we are not giving as much consideration as we should to co-ordinated agricultural information banks.

"There are still many different concepts of computerized electronic information retrieval and transmittal systems but it does seem to be generally accepted that eventually it will emerge in a combined form: a Videotex system of some nature (Telidon for example) for off-farm information such as weather, markets, public policy, and technology, and a "stand alone" home computer for the storage and retrieval of on-farm data as well as the very important function of combining the on-farm and off-farm information as an aid to decision making.

"The role of extension in the coming electronic environment will change over time. In the initial stages, the video machines will likely be located in extension offices where the operation can be observed by the public and monitored by agrologists. Centralized computer programs can also be accessed and used as training tools. As far as the farm computer is concerned, it is likely that, as with many other breakthroughs, the farmers with computers along with the commercial programmer-suppliers will probably be the instructors of extension agents.

"Eventually extension agents must be as proficient in aiding producers in getting their computers to perform as they are in helping producers get the best out of other farm inputs such as fertilizer, chemicals, marketing mechanisms, or operating relationships."

* * *

"The Ontario Ministry of Agriculture and Food (for example), is evaluating the use of microcomputers in county extension offices. In August 1981, 16 microcomputers were installed in county offices to provide a practical evaluation.

"The goal of the program was to assess the merits of the microcomputer:

1. as a problem solving tool to assist staff during consultation with farmers;
2. to access data bases;
3. for electronic mail;
4. for word processing.

"The big question is where to go from here. During the next few months, the decision will be made regarding the purchase of an additional 48 microcomputers.

"The potential for use of a microcomputer in a county extension office is restricted only by the imagination of the user. The Kellogg-Foundation have suggested that by 1990 at least 90 per cent of all county extension offices in the U.S. will have computers. It is believed that we in Canada must get into the same type of program so that we can be prepared to service the Canadian farmers of tomorrow."

The development of a farm program package

by Professor Robert Kok
Department of Agricultural Engineering

The rapid development and quickly decreasing cost of computer hardware has put the microcomputer within the financial reach of practically every small business, including most farmers. The low-cost machines can be very useful in management and automatic control if appropriate programs are available to run on them. A great variety of packages and programs now exist to help the farmers manage their accounts and optimize spraying times, feed compositions, fertilizer applications, and so on. Such programs are administered, run or marketed by federal and provincial agencies as well as by private companies and individuals. Many run only on large computers and require dial-up facilities, or are structured to run only on one type of computer. At present, comprehensive farm use of computers is largely limited to a select few brave pioneers who struggle valiantly with badly written tomes of instruction manuals and inefficient and unwieldly languages such as BASIC. These individuals are willing to devote a very considerable amount of time to learning how to program; in their efforts they are very similar to those who installed generators and electricity on their farms in the 1930s and 40s. There were but few who tried and fewer who succeeded.

We are developing an approach to computerized farm management in which a very wide variety of desirable system capabilities can be accommodated. Typically, the package will handle the following kinds of information, as well as many others:

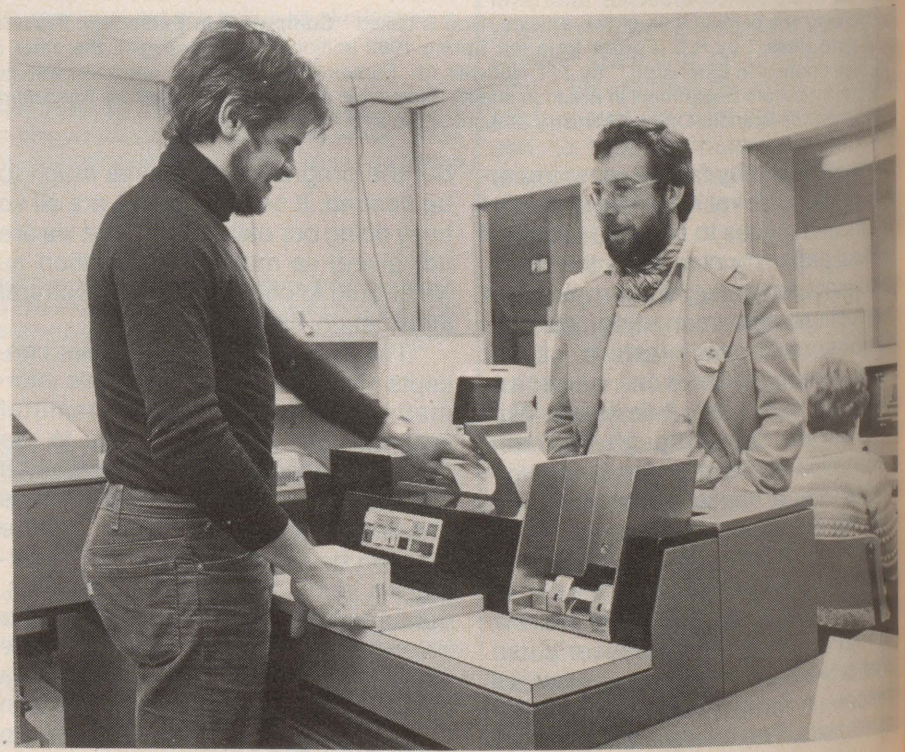
— accounting (i.e., all financial aspects);
— land resources and attributes (e.g., soils, drainage, slope, porosity, etc.);
— cropping history;
— fertilizer and pesticide application history;
— meteorological history;
— machine time history;
— production figures for individual units, i.e., animals, land parcels, machines, and so on;
— maintenance records for individual units, i.e., animals, machines, buildings, and so on;
— energy consumption;
— operating performance history of automatic control system.

The package will be capable of performing many functions. Some of these will be:

— information display and report writing;
— giving management recommendations on such items as breeding dates, cropping times, spraying and fertilizer applications, land working times, required maintenance work, and so on;
— preparation of tax forms and other routine paperwork required by government agencies;
— investment analysis and evaluation of alternate investment scenarios;
— prediction of production and cash flows;
— automatic control of many aspects of the farm from composing feed for individual animals to adjusting swine building ventilation rates to lowering and raising energy conservation curtains in greenhouses to scheduling of poultry lighting unit times, and so on. This will also include an automatic warning system.
— data acquisition, e.g., local wind velocity, temperature, sunshine, rainfall, etc. Manual as well as automatic data input will be accommodated. PDET (Portable Data Entry Terminal) use will be encouraged.
— interaction with government meteorological forecasting agencies to pass bulletins and warnings on to the farmer and so perdict optimal dates. e.g., of apple harvest and hay baling;
— interaction with government agricultural offices to collect relevant information bulletins and revisions (i.e., "electronic bulletin board" and "electronic mail" functions) and advise the farm of these.

All the above functions will be performed automatically by the package; the farmer will only have to indicate his needs in plain vernacular.

The approach we have developed is



based on the distributed computing concept. A small, cheap microcomputer will be located at the farm and will handle all communications. A substantial data bank, in "digested" form, will also reside at the microcomputer so that the vast majority of the farmer's questions can be answered instantaneously. A large remote host computer will provide extensive "intelligence" and "data digestion" capabilities. It will also provide complete package backup so that no data will be lost if the microcomputer fails. The microcomputer will automatically handle all communications with the host so that no human interference will be necessary in this procedure. This approach is safe, cheap, and efficient. In this manner, backup is provided by a large computer centre but data is always available at the microcomputer without having to dial up. The farmer can interact with his microcomputer as much as he wants and when it is convenient. The computing power of a large machine will be used when necessary for complex decision making and optimization.

This research and development project is being carried out in the following stages:

1. Package design;
2. Package writing;
3. Package testing.

The project is expected to last approximately for two years. In this period it is hoped that we can have an initial version ready in which most of the features we have described will be incorporated.

We will simultaneously be developing intelligent interfaces for our drain plan design system and our food thermal treatment optimization system. Both of these will be the subject of separate research projects. We already have gained extensive experience in the writing of intelligent, user-friendly interfaces during the development of our interactive surveying/mapping system over the last six years.

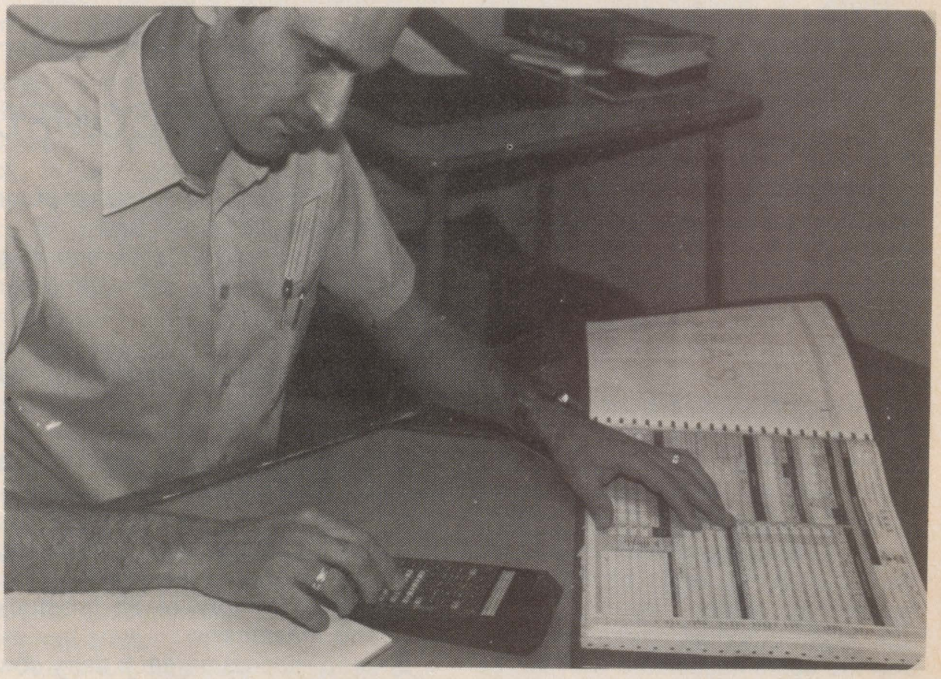
The Future of Computers in Dairying

by Jacques Jalbert, Agronome
PATLQ (DHAS), Ministère de l'Agriculture, Pècheries, et l'Alimentation du Québec,
Macdonald Campus

Milk testing programs have existed since the beginning of the century. In the early days these programs were designed to establish the genetic potential of the individual cows in a herd. The birth of the computer has allowed development in the field of data analysis, allowing, in particular, a more precise evaluation of the potential of bulls utilized in artificial insemination.

The first milk testing program to use the computer was the DHIA in Utah in the United States. Today, this privately operated centre processes nearly 100,000 cow records per month.

In Quebec the Dairy Herd Analysis Service (DHAS) (Programme d'Analyse des Troupeaux Laitiers du Québec, PATLQ) was initiated in May 1966 by Professor John Moxley at Macdonald College. This program not only supplied farmers information concerning lactations, it also gave advice concerning feeding, reproduction, and milk production costs. Since 1970, DHAS has become a joint program of Macdonald and the Quebec Ministry of Agriculture. All the activities of DHAS are related to the computer. The total program can be divided into three sections: the field, the laboratory, and the treatment of data.



Yvon Rioux, Field Staff Co-ordinator, using the Texas Instrument Model 59 while working with some DHAS data in his office at Macdonald.

The Field

There are 106 fieldmen who are equipped with Texas Instrument Model 59 (TI-59) and these are used for various calculations such as the average price received by the producer per hectolitre. The TI-59 programmable calculator is also used by DHAS fieldmen in cooperation with the dairy producer to establish feeding programs for the herd, and this can be done for various groups of cows within the herd according to their production level and the stage of lactation.

The Milk Analysis Laboratory

Ever since the beginning of operations in 1966 the DHAS laboratory has

been testing individual milk samples for butter fat content and protein. Since February 1977, an additional test is that of somatic cell counts. Currently, 51 per cent of the herds take advantage of this additional test.

Data Processing Centre

All the testing equipment in the laboratory is connected to a minicomputer, Hewlett-Packard 1000, so that no manual transcription of information from the test equipment to the computer is necessary. This not only speeds up the operations but it also eliminates the possibility of error. From the minicomputer the information is fed directly to the main computer in the data processing centre.

As of 1981, the time span between the fieldman's visit to the farm and the posting of the report by DHAS was less than five working days (or seven calendar days assuming a two-day weekend).

There are many brands of microcomputers on the market: Apple, Commodore, Digital, Hewlett-Packard, IBM, Radio Shack, and so on. These are currently being used mostly in the areas of bookkeeping and management.

It is quite possible that some day dairy producers will have access to such centres as DHAS via the telephone.

In the United States, a certain number of data processing centres make it feasible for dairy producers to have access to data that can be used for the management of their herd; for example, a list of cows to be bred or calving dates of individual cows can be updated at will. Such Centres as Provo in Utah and the ones in South Carolina and New York allow members access to their own data. In order to achieve this, the data processing centres have to have appropriate software (programs) as well as large capacity computers. In order for DHAS to supply the same type of service new software would have to be developed.

A committee in the U.S. has recently looked into the various scenarios open to coordinate the utilization of microcomputers on the farm with data processing centres such as DHAS. Irrespective of the format utilized in the future, one thing is evident: the tests on the milk itself such as fat and protein analysis, as well as the somatic cell counts, will have to be done in a central laboratory in order to keep costs at a reasonable level.

Linking farm microcomputers with the DHAS labs would reduce the total time required for the dairy producer to obtain test results. It is envisaged that fieldmen would be able to reduce the number of visits per farm.

It is expected that by 1990 all economically viable dairy farms will be equipped with a microcomputer and it is imperative that discussions be initiated in Quebec and in all of Canada that will allow the smooth integration of these various systems. As they say in the business, the hardware is there, but the software is lagging behind.

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*NOTES ON MICROCOMPUTERS**

by L.R. Schaeffer
Department of Animal and Poultry Science
Ontario Agricultural College

There have been numerous articles on the use of microcomputers to assist in the management of a dairy enterprise. Some dairymen have learned to write programs for areas of their dairy operation that are of importance to them. On the other hand, most dairymen are hesitant to explore microcomputers due to the flood of computer jargon and the costs associated with the exploration into the unknown. This article addresses the following questions:

1. Do I need a microcomputer for my farm?
2. How do I select the appropriate microcomputer?
3. How much time will a microcomputer demand?
4. How fast will the microcomputer become outdated? and
5. What is the fate of milk recording programs in the microcomputer boom?

Do I need a microcomputer for my farm?

Let's consider what we want a microcomputer to do:

a) handle all accounting, including that for the household;
b) keep inventory of all livestock and machinery;
c) keep records on each dairy cow in the herd including health, production, reproduction, and type;
d) keep maintenance records on all machinery;
e) make forecasts of future income, numbers of animals;
f) monitor feed intake of all cows and formulate rations;
g) play educational games with the children.

In addition to the above list, there are certain things we don't want a microcomputer to do:

i) to make errors in forecasts or projections;
ii) to lose information;
iii) to break down more than twice a year;
iv) to be too difficult to operate or maintain.

If you agree to the above lists, then you automatically limit yourself to a microcomputer that will cost from $5,000 on up. If you write your own programs, then you have to allow for the time it will take to write a fully operational, error-free, goof-proof program or sets of programs. If you buy programs that do all of the above and more, then you have to add another $1,000 to the total cost.

What benefits will be derived from the microcomputer? This will depend on the programs you write or buy. You may observe cows in heat more successfully and reduce losses associated with open cows. You may know when to expect excesses or shortages in milk yield or numbers of animals in milk six months to a year ahead of time, and thus be able to budget ac-

*This article is reprinted from *"Notes on Agriculture,"* June 1981, *"Notes on Agriculture"* is published by Ontario Agricultural College, University of Guelph.

ordingly. You may be able to save on eed costs with a good ration balanc- ng program. You may be able to spot ealth problems more quickly and ave on medical costs. You may save me in record keeping if you currently ave a hand calculator type of system. ou may impress a cattle buyer by pro- iding an instantaneous extended edigree with breeding and production ecords on the cows of interest.

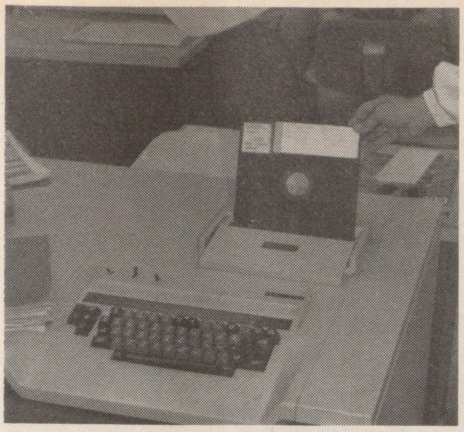
The value of the benefits derived om a microcomputer will vary for ach dairyman. If you own 100 cows r more and maintain records on each ow by hand, then a microcomputer ill definitely aid your management of e farm. If you have 50 to 100 cows, e microcomputer should be able to o many things beyond what you cur- ntly do by hand before you can justify e expenditure. However, it may be eneficial to share a microcomputer ith a neighbour. Hence the computer rogram should be capable of han- ing more than one farm's worth of in- rmation and not mix them up. airymen with fewer than 50 cows do ot need a microcomputer at today's ices, but two or three years down the ad may be able to afford one. Micro- mputers are not for everyone.

ow do I select the appropriate icrocomputer?

If you feel that a microcomputer is hat you need, then how do you find e right one? As mentioned earlier, e microcomputer should perform rtain functions. In order for a airyman to derive significant financial enefits from the microcomputer, it as to do many things.

You will need to look for the ap- opriate hardware which includes the icroprocessor, some kind of storage evice, a backup device in the event some disaster, a keyboard for enter- g information, a CRT (cathode-ray be) or television-like monitor, and a inter. All of these should be together one hardware package. Often the inter and/or backup device are omit- d from the off-the-shelf microcom- ters, and you find they must be ad- d later.

There are different kinds of micro- ocessors. Standard ones are the Z80 d 8080A. The microprocessor is the mponent that organizes most of the rk. The microprocessor is located a circuit board which slides into a



A floppy disk used in DHAS's data entry operation.

frame that can accommodate from one to 16 circuit boards. The circuit boards come in different sizes, but luckily the computer industry has approved a few as standards. They are S100 and STD. Ask the salesman, "What type of bus does this computer have?" If he answers S100 or STD, you know that it will be relatively easy to make additions or modifications to your system in the future at reasonable cost with component parts that are readily available from many sources. Many of the consumer-oriented microcomputer companies manufacture their own size of circuit boards which are only available from them, and thus you could be tied up with one company for ever.

Next ask the salesman how many slots are available for circuit boards. Of course, the more you have, the more flexibility you will have in the future to add new components. For example, you might want to add a controller that automatically waters the cows, or that regulates the lights, humidity, or temperature in a barn or house. You can always add another frame for more slots or perhaps a separate microprocessor if you use up all of the original slots.

There are basically three types of storage devices where information and programs will be stored. The storage device has to be very dependable. The different types are 1) tapes, 2) floppy disks, and 3) hard disks. Tapes are the cheapest and slowest form of data storage. You may need several tapes to store all of your farm's data, and it may take two to 10 minutes to find that information when you ask for it.

Floppy disks are more expensive than tapes ($1,500 to $5,000 for a floppy disk drive) but are faster and can generally hold more data. However, floppy disks are very susceptible to careless treatment and dust, and under those conditions you could find a week's worth of data missing or "unreadable." For a farm environment, floppy disks do not appear to be practical and could cause more headaches than you really want.

The hard disks are very new, very expensive ($5,000 and up), very reliable, very fast, and store many times more data than floppy disks or tapes. They are referred to as Winchester type disk drives and are stored in their own vacuum sealed enclosure. If you can afford them, hard disks are unbeatable. They come in different sizes and different storage capacities. The hard disk does require a backup device such as a tape cassette. With tapes and floppy disks you simply make duplicate copies of your data as backup.

All of the other components can be mixed and matched. You could have a colour CRT or black and white. You could have impact printers or printers that require special paper. The choice is really up to you as long as they all work well together.

The hardware is of little use without the software. Software is the program that tell the computer what to do. Ask the salesman what software is available. If he says, BASIC, FORTRAN, or PASCAL, then you are going to have to write your own programs. If he says there are games, financial programs or a dairy management program, then you ask for a demonstration. You should try to make the programs work to find out how easy they are to use. In the process, deliberately try to make errors (usually not a problem) in order to see what the computer does and to find out how easy it is to recover from an error. If you have trouble in the store, then you will have trouble at home.

Ask for a user's manual to read overnight and try again the next day to use the computer. If you have difficulty with the manual, you could have trouble with the computer.

Finally, before you spend your money, ask to "test drive" a computer in your home for 10 days. After all, the purchase of a microcomputer should be treated as carefully as the purchase of a new car. Also, find out what happens when something goes wrong,

(Continued on page 40)

DIPLOMA CORNER

by Jim Currie
Assistant Director, Farm Practice
Diploma in Agriculture Program

Quite often I'm asked where I was born. Now, as I come from a small town, I tend to answer this question by naming the region of the province first. If the person knows that, then I work from large town to small town until the questioner is lost. With this in mind, I am always amazed by the number of people who respond to my answer by saying, "Franklin Centre? Oh, you must know the Stevensons, we buy our apples there". . . or their syrup, or they are a friend of a friend who buys at Stevensons. The point is the name Stevenson is well known and the reasons are many. Tops on the list is the open and friendly way that the Stevenson family greet acquaintances and customers alike. This coupled with the delivery of top quality products keeps customers returning, often with their friends.

The current owner, Bill, is the fourth generation of Stevensons to operate the farm. Judging from the contact I have had with him, he has inherited in full the quiet confidence and social graces of the family. He has not, however, limited himself to some day inheriting the family assets. He is a businessman who is willing to take risks when opportunity knocks or circumstances dictate.

In 1960 Bill graduated from the Diploma Program at Macdonald after taking what was then the Animal Science option. His aim at that time was to increase the size of the beef herd at home and make it a primary source of income. Considering the price of beef and the fluctuations in that market, it's not surprising that he has concentrated more on his apples.

Never one to sit back and watch, he bought part ownership of the home farm in 1961, the year after graduation and before he was 21 years old. Since that time he has expanded to the point where he owns 320 acres. This land, plus the 160 acres that his father still owns, allows him to diversify, to spread his risks, and fill up his time. He still keeps a small Angus cow herd of 20 to 25 head which he claims helps spread the work load, utilize pasture-land, and eat the corn that he grows before replanting a section of old orchard.

Another of his "sidelines" is a very productive maple woodlot. Each spring he places about 6000 taps, all on a well organized, modern pipeline system. From this he produces an average of 1,500 gallons of syrup. Part of his strategy for increasing his production per tap and reducing labour costs is to put most of his line on a vacuum system. With all this modern equipment one might wonder why he still boils with the traditional wood arch. His reasons are hard to dispute: he has two full-time employees to keep busy and a bush to keep clean. Even so, it's a lot of work putting up 75 to 100 cords of three-foot wood. This way, he also gets rid of all the scrap from the small saw mill that he operates on the farm to supply his own lumbers needs for new apple boxes or building repairs.

Bill's main source of income now is from apples. His 65 acres of trees plus those on his father's land allow him to market between 20,000 and 25,000 bushels per year. He employs up to 30 pickers per year, acquired locally, especially this year since unemployment in the region is high. His main varieties are McIntosh, Cortland, and Lobo, but as he renews his orchards he is including new varieties to spread out picking and hit different markets. He sells most of his crop through larger packers, but direct sales at the door are also very important. To give him better control over his marketing possibilities he recently built an apple storage at home. This allows him to spread out his marketing to avoid times of the year when prices are lowest.

Bill Stevenson.

Within his orchards he has attempted to keep up with new technology in the apple industry as long as it is applicable to his situation. He uses dwarf and semi-dwarf trees in his new plantations, for instance, since he is convinced the added expense in planting and pruning will pay in better production. He has not, however, installed tile drainage and irrigation since he feels there is not enough proof that it can be justified on his gravel soils. It is his opinion that other producers in the area have benefited from water control because they are on loam soils. It is this sort of managerial balancing act that has helped Bill become as successful as he is.

To help him make these decisions he has had to draw on many sources for his information. Journals and bulletins help and by active involvement in local, national, and international associations he finds out what is developing in the fruit tree industry. This past summer, for instance, he was on the organizing committee for a tour of the area by the International Dwarf Fruit Tree Association. He has also cooperated with Macdonald on many occasions. This includes meetings, tours, and helping to direct the development of a property right beside his own farm that is operated by Macdonald.

How can a man with so many things

on the go have time for any social life? t's hard to say, but there are few social or beneficial activities going on in the area that do not involve the Stevensons. Whether it is Bill involved with the local volunteer fire department or his wife Mary collecting money for the hospital, they always seem willing to work hard to improve the community in which they live.

As for his college days: he remembers them as good times when he met many new contacts. As secretary of his class he has been able to keep in touch with his classmates and watch them progress. Unfortunately, he feels that his concentration on animal science hasn't helped him a lot and he pointed out that there have been drastic changes in production and storage methods in the fruit industry in the last 20 years. At least studying at Mac kept him close to the lifestyle he loves: agriculture, the community, and the people involved.

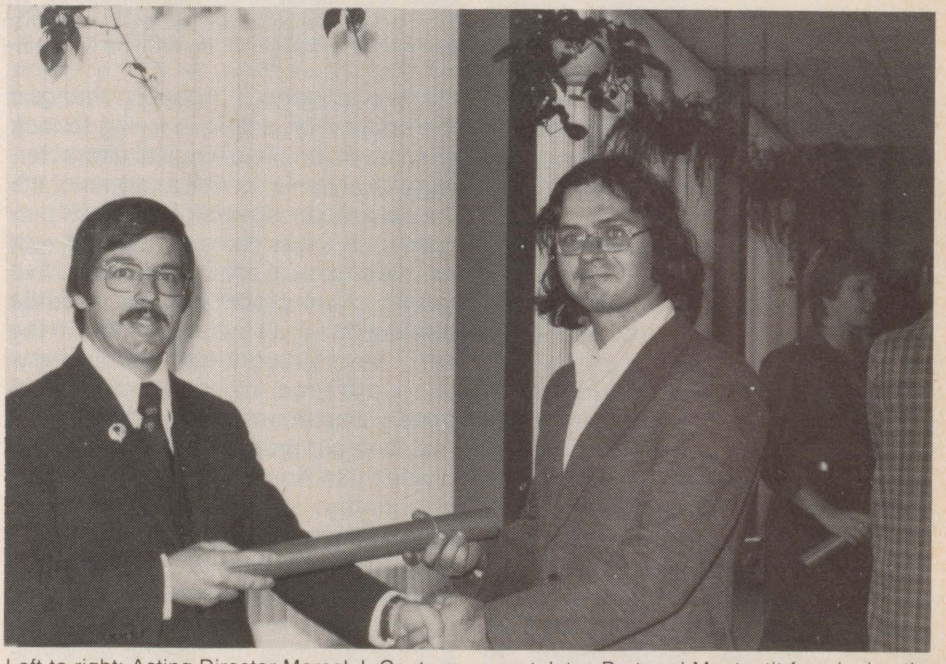
So, the next time you are looking for apples or syrup or just on a drive in the country — head south. Half way between Franklin Centre and Rockburn on Route 202 there is a large well-kept farm with red and white buildings surrounded by orchards. This is the domain of a successful man. Stop in and wish him well from all of us but don't stay long; he's got work to do.

Incidentally, this summer during vacations and while attending at least one wedding, I bumped into many Diploma graduates now living in the Maritimes. Congratulations to Robbie Sutherland (Dip '78) and his bride Lois and best of luck on their new dairy farm near Mabou, N.S. (Cape Breton). They will not be too far from the farm of classmate Gary Bennison and his wife. Gary was lured to the east coast by his brother Ross (Dip '70) who has an up-and-coming dairy farm in the Musquodoboit River valley. Ross happens to be just down the road from one of his classmates, John Brookehouse, beef farmer and senior technician at N.S.A.C. in Truro.

Also on the eastern swing, I met a pair of chicken ranchers — Mac Sprague and Dave Kay, both Dip '78, who have each bought farms near Millville (north of Fredericton), New Brunswick.

Just so that people don't think that there is a massive shift eastward, I also heard from Dave Livingstone, Dip '72. Dave is now the manager of the Eskimo Co-op at Eskimo Point, N.W.T. Good luck to Dave, Bev, and family in their endeavours under the midnight sun.

Photographed at the graduation ceremonies for the Diploma students of '82, which was held on October 2 in the Centennial Centre, were, left to right, Gary Wilson, Leon Beaudin, B.S.A. '22, and Professor Robert Broughton of the Department of Agricultural Engineering.



Left to right: Acting Director Marcel J. Couture congratulates Bertrand Montpetit for winning the MAPAQ Gold Medal. Another Dip graduate, Gunta Viting is in the background.

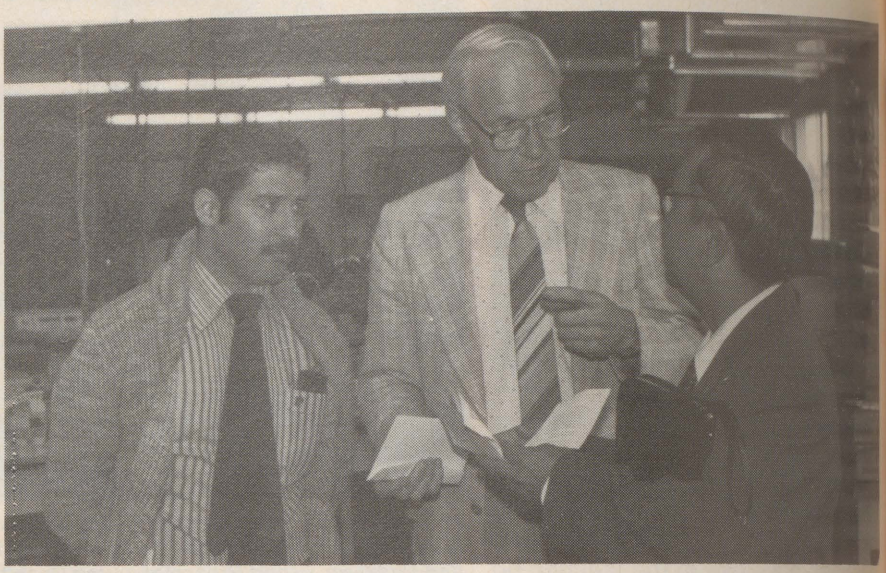
We enjoy hearing from our graduates at any time, especially with good news.

We will soon be celebrating the 75th Anniversary of graduations from the program. We would like, in some way, to mark this occasion. To do that we will need as complete a list of addresses as is possible. We appeal to those of you with contacts with your old classmates to write up a list of addresses and send it along to the following address:

Jim Currie
Diploma Program
Box 335, Macdonald Campus
Ste. Anne de Bellevue, P.Q.
H9X 1C0

Prof Profile

by Hazel M. Clarke
Editor



Medhi Abdelwahab, of Agrodev, left, and Mr. Wang Zengqi from the general bureau of animal husbandry of the Peoples Republic of China listen to John Moxley discussing milk analysis. Mr. Zengqi was part of a delegation from China who were visiting the campus.

Though he may be second in terms of longest continuous service of anyone now on Faculty at Macdonald, Dr. John E. Moxley, of the Department of Animal Science and Director of the Dairy Herd Analysis Service, has to be among the firsts in terms of honours and awards received for his contributions to Quebec and Canadian agriculture. The most recent recognition, which he received this past summer, was to be named a Fellow of the Agricultural Institute of Canada. Fellowships are awarded for "distinction worthy of national recognition' and are the highest honour which can be bestowed upon a member of this organization. Specifically, John Moxley was made a Fellow "in recognition of his outstanding achievements in dairy cattle genetics and the application of them to the development of a dairy cattle recording system" — DHAS.

John Moxley, who was raised on a mixed farm in Hawthorne, Ontario, came to Macdonald to study agriculture in 1941. He grew strawberries, raised pigs, and worked in the pulp and paper industry in order to finance his studies which were interrupted when he joined the army and later saw action as a Canloan officer in the British Army. He was wounded in October 1944 and returned to Canada and Macdonald in September 1945, receiving his B.Sc in 1947.

"I joined the staff in Animal Husbandry in 1947 — Bruce Baker in Chemistry and Physics came in '46, so that means he's the only one that has been here longer. I brushed up on a few animal science courses and then started on my Masters in genetics which I took on the downtown Campus."

Professor Moxley received his Masters in 1952 and continued teaching until 1955. "The courses have changed dramatically since I started teaching," he reflected. "They were much more applied courses in those days. Professor Lionel Hamilton and Professor Ness taught livestock judging — both dairy cattle and meat animals. As I never considered myself much of a judge, I probably changed the orientation a little in trying to look at some of the physiological characteristics of animals as well as some of the very practical aspects of livestock performance. I was more concerned with the measures of production traits. I've taught swine production, dairy cattle production. . . as a matter of fact in the early days I taught just about everything provided by the Animal Husbandry Department except dairying. At that time our present Department was divided into Animal Pathology, Animal Husbandry, Animal Nutrition, and Poultry Husbandry. Dr. Crampton, who was head of Nutrition, taught the animal breeding course before I took it over, and I've been involved in the animal breeding courses at all levels ever since."

Professor Moxley did his Ph.D. work in animal genetics at Cornell under the direction of Professor C.R. Henderson. Initially, he took a year's sabbatical in 1955 intending to complete the requirements in following summers. In retrospect he doesn't recommend the length of time it took him — he received his Ph.D. in 1966 — but there were some advantages not only for John Moxley but also for Macdonald and Canadian agriculture for it was during those years that the seeds for DHAS were sown.

"There were some advantages in spending a number of summers at Cornell," Dr. Moxley said. "I got to meet quite a number of the staff and graduate students. In '55 and '56 Cornell was in the initial stages of their computer oriented dairy herd improvement operations. I become familiar with the computer and with two gentlemen by the names of Professors Burke and Carter who seemed to spend most of the day and late into the evenings developing a program for New York State. My interest turned more and more to milk recording. Production in Quebec was low, and I felt we needed something similar here."

Professor Moxley pointed out that if Macdonald wanted to get anywhere in terms of agriculture and livestock production, the computing field was one way in which this could be achieved with a fair amount of success. Fortunately his suggestions were in accord with the thoughts of Dr. George Dion, then Dean of the Faculty of Agriculture. John Moxley gives Dr. Dion very high marks for the initial success of DHAS. "Dr. Dion was very keen on promoting the application of research to industry. He felt strongly that there wasn't much point in doing research if it wasn't applied and that is what DHAS is all about."

With Dr. Dion's support and the approval of the provincial government, the Dairy Herd Analysis Service was initiated in May 1966. It was introduced to the public at the International

alon in February of that year with the ank of Montreal sponsoring the exbit. According to Dr. Moxley it was ne of the best exhibits in the show at year and for some years after that. DHAS has been a success story that ever looked back. It started in 1966 th 17 herds, six field staff, and two boratory technicians. There are now me 320,000 records being processd each month; this represents 7,300 uebec herds. The staff has increasd to some 120 people in the field and in the offices and laboratories here Mac.

In discussing both his recent honour om AIC and the success of DHAS, is mild mannered man, who finds it uch easier to give laurels than to ceive them, said that he feels emarassed because it is really an award r what has been achieved in DHAS nd "I can't be held responsible for all s success by any stretch of the imgination." He singled out in the initial ages Dr. Dion, Dr. Herb MacRae, en Chairman of the Department of nimal Science, and Professor Peter amilton also of Animal Science (both ese gentlemen are now at the Nova cotia Agricultural College as Principal nd Registrar respectively). "The first eld staff were all recent graduates of e Diploma course and were young nd enthusiastic. Norman Campbell ecame an excellent Manager of the peration and through the years we've ad some excellent people: Orance ainville, Brian Kennedy, Bruce owney, John Brohan, Bob Moore, cques Jalbert, several graduate udents, and others currently with the ogram. I also find it satisfying that rmers themselves recognize the enefits and promote the service nong their neighbours. When we see e results at the farm level we — the eldmen in particular — get a great eal of satisfaction. A spin off has been e fact that we've been able to make se of the data for research rposes."

Dr. Moxley also pointed out that they ave quite good relations with the overnment in this joint operation. They have perhaps given us more eedom to operate than other proces and as a result we've both nefited. Certainly the program is well cognized across Canada: the four lantic provinces are on the service nd Saskatchewan has been a particiant since the summer of '81."

The quote "I guess I spend a bit more time at work than I should," can only be called an understatement. Though this writer attempted to steer the conversation on to other topics, all roads seemed to lead back to work and DHAS. However, travelling is something that John Moxley does enjoy and has been able to do quite extensively, both on business and with his family. When his two daughters where young, they and his wife, Kay, who was a dietitian in Stewart Hall here at Macdonald, did a lot of camping, and during sabbatical leave in '73-'74 they travelled a great deal in the British Isles and in western Europe.

International Dairy Federation

Travelling, too, allows him to pursue a favourite past time — photography. He told me that he must now have several thousand slides mostly of family, including one granddaughter, scenery, and, as gardening is another hobby, of plants, botanical gardens, greenhouses, and arboretums. He has just added 10 rolls of film taken in the Peoples Republic of China where he and three other Mac Professors visited this past summer. He also added nine rolls from a trip to Russia, also undertaken this past summer. As a consultant to the Canadian Committee of the International Dairy Federation, Professor Moxley has attended annual meetings in various countries: France, Switzerland, Great Britain, Spain, and this year Russia.

"Canada has been quite an active member of the Federation and I find it an interesting and, I think, important organization because it deals with all aspects of the dairy industry from production through to processing. The Federation gives one an excellent opportunity to exchange ideas and, of course, this year it was particularly interesting to be able to travel around Russia and meet the people. As individuals you couldn't meet more pleasant people.

"We were able to visit a couple of farms and a dairy. The herd on the first farm, which was just outside Moscow, consisted of 60 Ayrshires and 200 Holsteins, the second herd, in Estonia, was all Holstein. I was a little disappointed in some respects. They seemed to operate quite satisfactorily but they weren't exceptional. Production would be what we would consider about commercial level or even below in spite of the fact that in both areas they have fairly good feed resources. Perhaps we have more opportunity to improve more efficiently than they."

The timing of his trip to Russia coincided with the AIC Conference in Vancouver. Consequently he received the Fellowship at the Canadian Society of Animal Science annual meeting which was held in early August in conjunction with the American Society of Animal Science's meeting.

In this instance it was the Canadian Society of Animal Science who nominated Dr. Moxley for the Fellowship. In 1977 the Society awarded him a Certificate of Merit, the same year that l'Ordre des Agronomes du Québec made him a Commandeur de l'Ordre du Mérite Agronomique, this in recognition of his contribution to Quebec agriculture and, in 1979, the AIC awarded Dr. Moxley the Grindley Medal. This medal is awarded — to quote the AIC — "a Canadian who has made one particular identifiable contribution to Canadian agriculture, the impact of which has been far-reaching and recognized within the past five years." Truly outstanding recognition by his professional peers.

A darkroom for his photographic pursuits, a greenhouse for his green thumb — these he sees as future possibilities. Meanwhile, planting flowers, taking photos, or playing golf at a nearby nine-hole course — "I'm a duffer" — allow John Moxley the occasional moment to forget about work and the future needs of dairy production in Quebec and Canada.

John Moxley told me that there are seven centres in Canada providing milk recording services. While DHAS is the newest centre in milk recording, it now processes about 40 per cent of the herds and cows on milk recording in Canada. Looking at DHAS as a whole, he still sees room for improvement. "Our program has been aimed at the average farm and we have herds that are approaching 10,000 kg per cow per year as a result of the program and because they have been provided with the information they needed to get there. We still have a lot of herds that could benefit from milk recording as well as those that are still not making full use of the service."

Thus there are still challenges and, fortunately, John Moxley is still very willing to tackle them.

Keeping House Plants Healthy

by Professor Calvin Chong
Department of Plant Science

It is fall once again and presumably all the leaves have been raked and discarded. Now that we are out of the garden we can devote more interest to indoor house plants.

Most house plant disorders result from improper home environment and too much love and care. Keeping these plants alive and healthy during the winter and yet avoiding rapid growth by providing adequate light, water, and fertilizer are key factors for ensuring success. Foliage plants are the easiest house plants to care for because they require less light than flowering plants.

Preconditioning

House plants require preconditioning to enable them to adapt to the drier, low light conditions of the home. In late August start moving your favorite plants into a shadier location outside. Then bring them indoors at night and keep them inside the house for progressively longer periods during the day.

Preconditioning is normally carried out on a large scale by growers in specially shaded areas where frequency and application of fertilizer and water are restricted. Four to eight weeks are required for most plants, but some types such as *Ficus benjamina* require as much as six months. Obviously, this extra care and precaution add to the cost of these plants. Purchasing bargain plants not properly preconditioned frequently results in problems.

Proper home environment

House plants differ in their light requirements and are often classified according to this factor. In most homes, areas in the centre of rooms, hallways, or along areas exposed to direct light from south and west windows are high light areas; inside walls are low light areas. In these low light areas where light intensities may be in the order of 500 lux, little or no growth will occur. In less light than this plants will deteriorate gradually. Avoid sudden changes in light intensity. House plants adaptable to low light such as Chinese evergreens, sansevierias, philodendrons, and ferns are easier to care for than those requiring higher light intensities such as *Ficus benjamina,* scheffleras, crotons, palms, and citrus.

Most house plants grow best in an even, moderate temperature ranging from 15 to 22°C. Temperature drops, i.e., below 10°C, commonly practised today to conserve energy, can cause plant damage. During the winter, move your plants back from the window so that neither foliage nor flowers touch the glass. Drafts of hot or cold air may be injurious.

House plants prefer a higher humidity than that found in most homes. Low humidity is especially a problem during the winter when the average room has only between 10 and 20 per cent. Thus, any means of increasing the humidity is beneficial to the plant. Grouping plants together, placing them over moist pebbles, or in special containers such as fish tanks will help to increase the humidity around the plants.

Proper culture and care

Over-watering causes the greatest number of house plant problems. There is no time schedule for watering. Many house plants will require watering only once a week and some even less often. To keep house plants moist while on vacation, enclose the pot and soil surface in a plastic bag.

During the winter when plants are growing slowly or in dormancy keep plants on the dry side. Check the soil frequently and water only when necessary. Use water at room temperature or tepid water (approximately 32°C). Plants absorb tepid water more readily than cold water. Do not use chemically softened water.

As a general rule remember that lots of water applied infrequently is better than little water applied frequently. Some plants such as succulents and cacti thrive best under drier conditions.

Use of good brand-name soilless mixes will help to prevent many common house plant disorders. Most of these have been pre-sterilized to prevent trouble from weeds, diseases, and other soil pests. They are well aerated, have good water-holding capacity, and allow rapid drainage.

Although soilless mixes may contain some plant food, regular feeding with dry or liquid fertilizers will be required to maintain healthy plants. But, as with watering, house plants need not be fer-

In addition to numerous scientific papers, technical reports, and popular articles, Professor Calvin Chong, B.Sc.(Agr.)'68, M.Sc.(Agr.)'70, and Ph.D.'72, has written a series of Agriculture Canada bulletins on various horticultural plants. During a brief tenure in 1974 as Technical Information Officer with the Public Services Section, Information Division, Agriculture Canada, Ottawa, where he provided information to home gardners and the general public, Professor Chong wrote two bulletins, *Growing Garden Tomatoes,* Publication 1558 and *Growing Garden Potatoes,* Publication 1559. After serving as Research Scientist (1974-1977) in the former Ornamentals Research Service of Agriculture Canada's Research Branch in Ottawa, Professor Chong joined the Department of Plant Science, where he wrote *Growing Garden Grapes,* Publication 1677. His most recent addition to this series is *Care of Foliage Plants,* Publication 1732.

These bulletins are available in English or French and can be obtained free from (a) the Communications Branch, Agriculture Canada, Ottawa K1A 0C7, (b) Agriculture Canada Institutions across Canada, (c) many local extension services, including Macdonald's, and (d) from Professor Chong, Department of Plant Science.

lized frequently. As with over-watering, many more problems arise om over-feeding than under-feeding. pplication of house plant fertilizers vice a year, especially during the pring and summer, may be entirely dequate to maintain most plants. An dditional one or two applications may e required if an appreciable amount f growth is desired.

iseases and pests

Disease and pest problems of house lants occur relatively infrequently in ost home environments. Plants are egularly sprayed by commercial pro-ucers, but diseases or eggs of insects ccasionally are carried over into the home environment. The dry conditions in homes during the winter help to prevent the spread of foliar diseases. As a precaution, before grouping a newly bought house plant, or a plant re-introduced to indoor conditions, with your other house plants, keep it in isolation in another room for about two weeks to observe the possible presence of insects. Insects that infect house plants generally belong to one of two groups: those that eat parts of the plants and those that suck the sap. Most insects infecting house plants belong to the second group. The most common of these are mealy bugs, mites, scale insects, and aphids.

Wiping or washing plants with lukewarm soapy water on a regular basis will help to eliminate many of the sap-sucking pests. Occasionally, badly infested plants may require the use of chemicals. There are many commercial chemicals available. These come as aerosol sprays, liquids, or dusts, and may be fungicides, insecticides, or a combination of both. Observe all precautions on the label before using and mix only at the rate given.

More information

More detailed information can be found in the recent bulletin *Care of foliage plants,* Canada Agriculture Publication 1732, written by this author (see accompanying box).

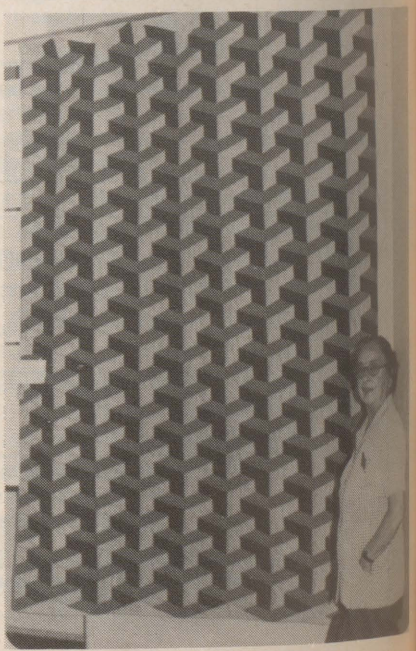
A GUIDE TO HOUSE PLANT DISORDERS, POSSIBLE CAUSES, AND CURES

ORDER	CAUSE	CURE
wn leaf tips	• Sensitivity to fluoride or chloride in water	• Common on plants such as spider plants, dracaenas, cordylines, and some palms. • Let heavily chlorinated water stand in a pan overnight before using. • Cut off brown tips with scissors.
	• Low humidity	• Improve humidity by growing plants together, setting over moist sand or pebbles or using a home humidifier.
	• Improper watering	• Check soil frequently; water only as necessary.
f drop	• Dry root ball	• Common on plants such as ferns and Ficus. • Increase humidity. • Soak in a pail of water, or submerge pot in water until no more bubbles escape; drain well.
	• Exposure to cold drafts	• Change location.
	• Spider mites	• Spray with miticide.
er leaves turn yellow and p	• Shock of greenhouse to home	• Move to brighter location; do not fertilize for several months.
	• Lack of light	• Move to brighter location.
	• Lack of plant food	• Fertilize with soluble formula mixed to proper concentration.
	• Water-logged roots; may result in root rot disease	• Remove from pot and set on newspaper to drain; improve drainage by using a lighter soil mix. Thereafter, water only as necessary.
	• Sudden change of light conditions	• Move gradually over a period of several weeks.
	• Low night temperature	• Water less frequently and fertilize sparingly.
	• White patches on dry soil surface indicate excess salts caused by unabsorbed fertilizer	• Thoroughly drench the soil to wash out these salts.
	• Compact soil, pot-bound	• Transfer to larger pot.
ves small and far apart	• Lack of light	• Move to brighter location.
e leaves, leaf spots, tches, blemishes	• Sun scorch	• Move out of direct sun.
	• Dry root ball	• Move away from heaters. • Soak in a pail of water or submerge pot in water until no more bubbles escape; drain well.
	• Pesticide injury	• Wash leaves with soapy water. • Cut off and discard severely affected leaves.
ite or brown wart-like stals on leaves or stem; y appear as tiny blisters.	• Called ocdema; results from excess water	• Water less frequently. • Use water at room temperature.
ting	• Lack of water	• Soak in a pail of water.
	• Excess of fertilizer	• Thoroughly drench the soil to wash out excess.
	• Root rot disease caused by excess water	• Water less frequently; use a good potting mix. • Drench with a fungicide formula for house plant use.
ite powdery substance leaves	• Fungus disease caused by powdery mildew	• Do not wet foliage. • Avoid locations close to window with large fluctuation in day and night temperatures. • Spray with a fungicide for house plant use. • Cut off and discard affected leaves.

Bud drop	• Lack of food • Excess water • Cold drafts • Low light • Low humidity	• Fertilize with soluble formula. • Water less frequently. • Change location. • Move to brighter location. • Improve humidity by grouping plants together, setting over moist sand or pebbles or using a home humidifier.
Lack of flower formation	• Lack of food • Low light • May be a seasonal bloomer (azalea; poinsettia) • May require a dormant period (cacti).	• Fertilize flowering plants with RX-15 or other formula high in phosphorus content. • Move to brighter location.
Cupped, curled or distorted leaves	• Pollutants in the atmosphere • Aphids • Dry root ball	• Check for leaking gas. • Avoid spray or vapours from cleaning fluids. • Spray with insecticide material for house plant use. • Cut off and discard infected leaves. • Soak in pail of water.
Unbalanced shape, leaves or stems bent towards window	• Leaves are attracted towards light	• Turn plants a half-a-turn once every week to keep shape in balance.
Tiny white spots on leaves and very few webs on leaf undersides; may cause leaf drop or growth distribution	• Spider mites	• Wash plant thoroughly from underside with tepid, soapy water. • Spray with miticide or insecticide material for house plant use.
White cottony masses	• Mealy bug	• Dab white masses with rubbing alcohol. • Spray with malathion, making sure to penetrate the cottony mass to get at the insect.
Brown or white, round or oval-shaped bumps (1-5 mm long) on leaves or stems; may cause off-colour leaves	• Scale	• Flick off with Q-tip soaked in rubbing alcohol. • Wash and scrub infected plant parts with tepid, soapy water; do not wash entire plant with alcohol as this will kill the plant as well as the insects.
Tiny green (sometimes orange or brown) insects (1 mm) causing distortion of new shoots	• Aphids	• Spray with insecticide material for house plant use.
Tiny jumping white flies on surface	• Incompletely sterilized soil	• These are annoying but normally not harmful to the plants. • Use a soil drench of 2 tablespoons of malathion per litre of water; thoroughly wet the entire root ball; repeat if necessary.

Joan E. Habel Quilt Festival

Montreal's first major quilting show held in late June and sponsored by the Montreal YWCA was a fabulous success and an extremely fitting tribute to Joan Habel, Dip. (Agr.)'74, who died in December 1981 after a lengthy illness. There was an exhibition of quilts, including several on loan from the McCord Museum, one of Norm Campbell's, Dip. (Agr.)'66, grandmother's, dated 1897, and several by Sheila and Mary Wintle of Richmond. Quilts, quilted articles, and quilting supplies were on sale, and several workshops were held. Friends of Joan Habel's including the Wintles, Helen Munson of the YWCA, shown at left with Lynne Muirhead, Dip. (Agr.) '75, deserve a great deal of credit for the festival's success. At right, Mary Sicard of the Waterloo-Warden WI explains the intricacies of this delightful pattern. A quilter herself, Mrs. Sicard was one of many who enjoyed the two-day event.



FALL FOLIAGE — FEATURE OF CAMPUS HOMECOMING

"The weather hasn't been this nice since I came here in 1977," explained Dr. Lew Lloyd, Dean of Agriculture and Vice-Principal of Macdonald, as he and his wife Pauline, H.Ec. '48, prepared to greet Macdonald graduates for the Annual Homecoming festivities on October 2nd.

The picturesque scene reflected the success of the re-development of the campus which is now centred in the Macdonald-Stewart Building area. Over 300 graduates and friends took advantage of the fine weather to take a leisurely walk or a van tour of the campus and to visit selected areas including Brace Research, the Raptor Centre, or the Pilot Plant. Some came from such distant locations as Dr. Bernard Elliott, B.Sc. (Agr.) '49, from Milwaukee; Dr. Harold Simkover, B.Sc. (Agr.) '47, from California; Janet (Slack) Sale, B.H.S. '42, from Australia; Bill Ritchie, B.Sc. (Agr.) '51, Regional Vice-President of the Graduates' Society from Halifax; Elinore Thomas, B.H.S. '32 from Victoria; Vivian Burland, B.Sc.(H.Ec.) '48 from Bermuda; Helen, H. Ec. '52, and Les Young from Alberta. Both Helen and Les worked at Macdonald and currently Les Young is the Minister of Labour for Alberta. There was a good representation of graduates from every major city in Canada and, of course, from other countries including John, B.Sc. (Agr.) '62, and Jane Gates from Kingston, Rhode Island, and Ken Newman, B.Sc. (Agr.) '57, from Jamaica. A total of 196 honour year graduates registered which bolstered by spouses, staff, and other graduates.

THE 'NEW' MACDONALD JOURNAL: All graduates had favourable comments about the new look of the Journal. Seen looking at an issue are, left to right, Peter Knox, B.Sc. (Agr.)'74, President-elect of the Branch, Emeritus Professor Helen R. Neilson, B.H.S.'39, M.Sc. (Agr.)'48, and William Ritchie, B.Sc. (Agr.)'51, Regional Vice-President of the Graduates' Society.

Busy Schedule Welcomes Everyone

Reunion was also an occasion for graduates of Food Science, or Home Economics as it was previously known to meet for a seminar on Saturday morning with Dr. Shirley Weber, Director of the School of Food Science, for an update on research and teaching in this field at Macdonald.

The Macdonald Reunion Luncheon which followed is a popular part of the annual Reunion program and attracted more than 150 graduates and friends. This provided Dr. Lew Lloyd with an opportunity to report on the encouraging plans and programs on the campus. At the same time, he honoured the class of 1932 and presented them with the 50th anniversary gold pin as a memento of the occasion. The Macdonald Branch of the Graduates' Society reviewed its activities of the past year, and Suzelle Barrington, B.Sc. (Agr.) '73 and Chairman of the Nominating Committee, presented the slate of officers and directors who were elected at the luncheon meeting.

Larry Johnston, B.Sc. (Agr.) '72, the out-going President of the branch, thanked all the officers and directors and interested graduates for the good work on behalf of the College and for the promotion of the Macdonald graduates' activities. He also announced that the Honorary President of the Branch, Dr. David Stewart, was unable to be present at the Reunion Luncheon since he was attending ceremonies in Prince Edward Island for his investiture as Chancellor of the University of Prince Edward Island. On behalf of the graduates present, Larry Johnston acknowledged the continued good work of Dr. Stewart in support of the promotion of quality education in Canada and, in particular, at Macdonald.

50TH ANNIVERSARY CLASS OF 1932: Macdonald graduates and staff honoured the class of 1932 at the Reunion Luncheon. Front row, left to right, Frances King Findlay, Joyce Petrie, Eleanor Thomas, and Dorothy Cooper. Back row, left to right, Gordon Findlay, Charles Eaves, George Gibb, Dr. Lewis Lloyd, W.S. Hunter, and Rex Beach.

"WHERE IS THE CLASS OF '37?": We were able to catch up to some of them during Reunion. Left to right, Phyllis Hood, Celia (Fergusson) Henneberry, Dorothy (Graves) Wilson, and Dorothy (Laidlaw) Neff helped to win the Honour Shield for their year.

PLANNING BRANCH ACTIVITY: The Macdonald Branch is ready for another busy year. Discussing details are, left, Suzelle Barrington, B.Sc. (Agr.)'73, Chairman of the Nominating Committee, Mr. Barrington, Larry Johnston, B.Sc. (Agr.)'72, Past President, and Jim Currie, Dip. '70, B.Sc. (Agr.)'81.

ONOUR YEAR CLASSES "ALL IN A ROW": necking the class photos are (kneeling) Bill Rit-ie, B.Sc. (Agr.)'51 and Harold Blenkhorn, B.Sc. gr.)50, and (standing) Kevin Boushel, Dip. Agr. 7, and Norman Campbell, Dip. Agr. '66.

The Officers and Directors of the ranch for 1982-83 are as follows:

on. President
. David Stewart

ast President
uzelle Barrington, B.Sc. (Agr.) '73

mediate Past President
Larry Johnston, B.Sc. (Agr.) '72

esident
eter Knox, B.Sc. (Agr.) '74

easurer
ichel Lareau, B.Sc. (Agr.) '69

ecretary
an McHarg, B.Sc. (H.Ec.) '60

aculty Rep:
. Hans Hueckel, B.Sc. (Agr.) '60

rectors
ordon Anderson, B.Sc. (Agr.) 5, MSc. (Agr.) '57
oria Bishop, B.Sc. (H.Ec.) '57
arold Blenkhorn, Dip. Agr. '50, Sc. (Agr.) '74
evin Boushel, Dip. Agr. '77
eorge Eades, B.Sc. (Agr.) '74
obert Heslop, B.Sc. (Agr.) '53
at Jared, B.Sc. (H.Ec.) '57
Grant Ross, B.Sc. (Agr.) '56

hairman,
ominating Committee
uzelle Barrington, B.Sc. (Agr.) '73

RESEARCH REPORT IMPRESSES GRADS

"We are often accused of hiding our accomplishments under a bushel," noted Peter Knox, in his introduction to the luncheon speaker. "However, the results of the excellent work of a small but dedicated staff deserves reporting."

In support of these favourable comments the Associate Dean of Research, Dr. "Gus" MacKenzie, addressed the luncheon group on research at Macdonald. His report and commentary were extremely encouraging, pointing out that McGill's top three in research are the Medical Faculty, the Science Faculty, and the Faculty of Agriculture at Macdonald. He outlined the philosophy guiding the research and the important ingredients including capable staff support, leading researchers, and financial assistance to permit projects to be developed. The reputation for excellent research at Macdonald has in recent years attracted considerable financial support to the point that research grants are almost surpassing the operating grant for all of Macdonald's programs and projects. In addition, he briefly touched on the international research being conducted by Macdonald staff and noted that we are foremost in this regard among colleges and universities in Canada — and perhaps throughout the world in respect of the size of Macdonald and its output in this important area.

Dr. Mackenzie matched the weather in his very upbeat report on such a significant area as research at Macdonald with the increased enrolment in graduate studies which is essential to a successful research program.

Dinner-Dance Reunion Highlight

After the luncheon, tours, visits, general relaxation, and renewing of acquaintances were the order of the day at the registration centre in the Centennial Centre. In addition the display of honour class pictures set up by Kevin Boushel and several of the directors of the branch drew many amused and surprised glances.

The Branch Reception in the early evening attracted more than 180 graduates and friends and then moved on to the very enjoyable Dinner Dance in the Ballroom. Classes were seated by reunion years which prompted some spirited cheers and class songs. All of this enjoyable dinner activity was highlighted by the Toast to the Class of '57 from Peter Knox. In reply Kevin Woolrich, one of the three class chairmen for Agr. & Home Ec. '57, noted that, "all of the security staff and senior officers of the College would be relaxed once the last member of the class of '57 had left the Ste. Anne de Bellevue campus and was headed back home!" He continued his toast to Macdonald and was delighted to have learned throughout the Homecoming activities that Mac is still a delighful and memorable campus providing study and research programs of world-wide significance.

Dr. Lew Lloyd, Vice-Principal and Dean of Agriculture, responded to the toast, and in his comments to the Class of '57 and to the Dinner-Dance crowd he briefly reiterated his positive notes on the campus and presented a memento of the 25th anniversary Reunion to the Class of '57. He obviously took executive privilege and made a presentation of the 25th anniversary pin to Mrs. Pat Jared.

The final note for the Reunion program before the dancing and socializing began in earnest was the report from Registrar Steve Olive, B.Sc. (Agr.) '68, the Chairman for Reunion '82. He announced that the McGill computer had been used to determine the honour class which had won the shield for the best class participation in Reunion '82. The result indicated that the honour shield was won by the Class of '37 and the Class of '57 for slightly more than 25 per cent participation. In making the presentation, Steve Olive once again acknowledged the good work of the class chairmen who had been so helpful in encouraging a favourable response to Reunion. He particularly acknowledged the work of the class chairman of '37, Scott Kneeland, and the trio of Chairmen of the class of '57: Gloria Bishop, Pat Jared, and Kevin Woolrich. Other class coordinators included: Ginger Stones, Agr. & Food Science '77; Bill Suddard, Agr. & Food Science '72; Lyall MacLachlan, Agr. & Home Economics '62; Helen Goldhamer, Agr. & Home Economics'47; Douglas Henderson, Agr. & Home Economics '42; Dr. A.W.S. Hunter, Agr. & Home Economics '32.

"IN BETWEEN EVENTS": Trying to decide on the next Macdonald reunion event are, left, Faye Johnston, B.Sc. (F. Sc.)'72, Linda Skinner, B.Sc. (H.Ec.)'62, Pam Seville, B.Sc. (H.Ec.)'62, and Jean McHarg, B.Sc. (H.Ec.)'60.

A SPECIAL WELCOME: Greeting our graduate from the furthest location are, left, Hazel Clarke, Editor, Macdonald Journal, Dr. Jean David, Associate Dean, Janet (Slack) Sale, B.Sc. (H.Ec.)'42, from Australia, and Irving Slack, B.Sc. (Agr.)'48, Past President, Macdonald Branch.

It was an interesting observation from Angus MacMillan, Dip. Agr. '83, who, together with 12 of his classmates, had provided student assistance throughout the busy day. "We now see how this is done, and we really look forward to our reunion in 1988!" There were many more promises made to be back at Reunion in the future. For example, Steve Olive will be back for his 50th anniversary in the year 2018, but everyone else is probably only looking ahead to our next clan Macdonald Reunion which will be held on October 1, 1983!

Graduates of years ending in 3's and 8's get ready!

MACDONALD ATHLETICS: PRESENT

Part II of III

y W.R. Ellyett
irector, Athletics Department

1979 the Athlelics Department at acdonald decided that it would novate the athletic facilities in the ewart Hall Residence. This goal has en reached and the area, which nctions as a completely independent it, is known as the Stewart Complex. The Complex has its own entrance, hting, and heating as well as its own nitorial service. The main purpose in tting up the facility in such a man- r was because of the uncertainty of e continued operation of Stewart all. If the Residence does have to se its doors some time in the future, e had to make certain that the hletics Department could still erate.

The Complex includes the gym and ol which have been renovated to eet the needs of our students. Added the basement area are changing oms with showers and lockers, a ight room, a fitness room, a lounge, d a storage room. The reception ea, main offices, and equipment spersal room are on the main floor. The Stewart Complex is open to the udents from 7 a.m. to 11 p.m. dur- the week and 1 to 5 p.m. on ekends. There is, of course, no arge to our students as they all pay udent service fees. There is a small arge for staff who wish to use the cilities.

To complement the Stewart Com- ex, we also have available the Glen- nan rink, the lakeshore tennis urts, the intramural playing field, and e softball diamond. Students use the k for broomball, hockey, and ating. The rink was also used for rling but we now curl at the Ste. An- s Curling Club. Four clay surface nis courts are used by students in e spring and fall, the intramural play- field is used for soccer, and the tball diamond for intramural softball.

The program offered to students is oken down into four areas: instruc- nals, recreationals, intramurals, and ercollegiates.

The instructional program is the gest with offerings for the students itness, dance, aquatics, C.P.R., and rseback riding to name a few.

The recreational program allows the students to exercise without any formal organization. Hours have been put aside in each facility — gym, pool, and rink — to allow students to interact freely. Recreational programs include badminton, skating, archery, and swimming.

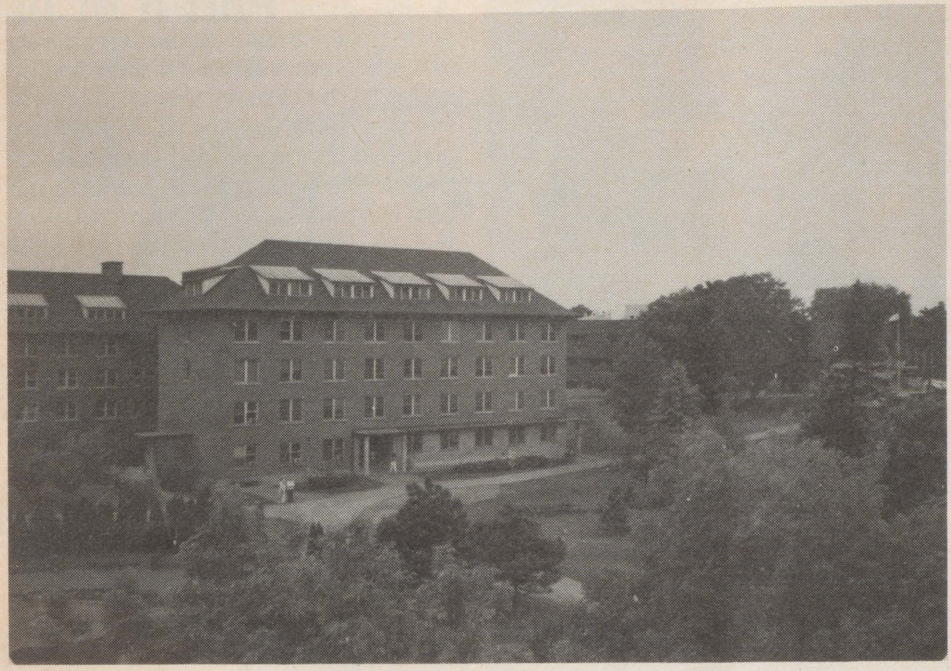
Directly behind centre field is the Macdonald-Stewart Building; Behind right field is the Barton Building which houses the Library. Below: a rugged game of rugby.

The intramural program is divided into two parts: interclass competition and open league competition. Interclass means exactly that, with students from each year competing against each other. In open league any group can enter a team for competition; it could be geographical, departmental, or class. Some activitities include basketball, volleyball, hockey, softball, and broomball.

The most changes since the 50s and 60s have occurred in the intercollegiate program. Macdonald fields teams in Woodsmen, Rugby, Wrestling, and Broomball. If a Mac student wants to play an intercollegiate sport which is not offered at Macdonald, then he or she is eligible to play for McGill. The Athletics Department helps to offset expenses for travelling.

The Macdonald Athletics Department tries to keep up with activities which are the most popular with the students and thus is always willing to make changes in the various programs.

Laird Back in the Clan



by W.C. Shipley, B.Sc. Agr. '48
Executive Assistant to the Vice-Principal

For more than 75 years, residence life has been an integral part of Macdonald Campus activities. In September of 1982 it took on new dimensions.

Laird Hall, built in the late 1950s and early 1960s, has undergone complete renovations to accommodate Macdonald students, both undergraduate and graduate.

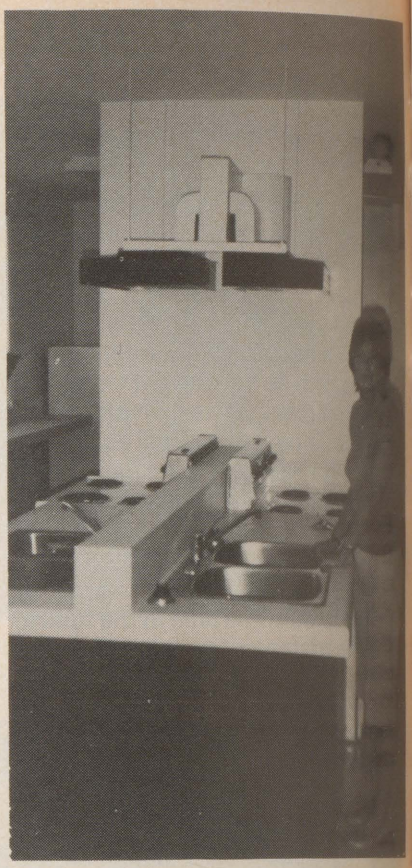
Occupied in the 1960s mainly by Faculty of Education students, Laird Hall was transformed into office and classroom facilities for John Abbott College in the early 1970s after the transfer of Education to the Montreal Campus. For some 10 years, the "Main Wing" of Laird was utilized by John Abbott College while the "New Wing" served to accommodate approximately 75 Macdonald graduate and senior undergraduate students. The other Macdonald resident students (about 150) lived in Stewart Hall (Women's Residence) and Brittain Hall (Men's Residence) along with John Abbott students.

The refurbished Laird has a capacity for some 270 students and the residence is arranged on a co-educational basis. Students living in Laird Hall enjoy renovated rooms, newly installed and equipped kitchenettes, comfortable lounge facilities, upgraded safety features, and other amenities to help make their residence life a complete and meaningful part of their university experience.

With the restoration of Laird Hall, situated between the Macdonald-Stewart Building and the Centennial Centre, the physical redevelopment of the Macdonald Campus is essentially completed.

Stewart Hall, traditionally the "Women's Residence", will operate during 1982-83 to accommodate some 200 John Abbott College students on a co-educational basis. Under an agreement involving Macdonald/McGill, John Abbott College, and the provincial government, residence operations will continue under Macdonald/McGill this year. Commencing in 1983, it is expected that John Abbott College will be more directly involved in Stewart Hall operations.

Brittain Hall (Men's Residence) will not operate as a residence during 1982-83 as the residence needs of Macdonald and John Abbott can be met by Laird and Stewart Halls. Macdonald/McGill and John Abbott are currently exploring alternative uses for Brittain Hall. Suggestions from graduates are most welcome!



Murielle Moisan, Residence Co-ordinator, enthusiastically gave a tour of the new, modern, fully-equipped kitchens in Laird Hall. As well, the bedrooms have been renovated, and there are newly furnished lounges on each floor.

A student relaxes between classes in the main lounge inside the front entrance to Laird. The focal point of this area is the magnificent mural designed by Marie Harney in 1959. Mrs. Harney was the Food Supervisor at Glenaladale and Assistant in the School of Household Science from 1957 to 1959 and then became Dining Room Manager of Glenaladale until her retirement in 1965.

newsmakers

on campus

NTEAZ ALLI has been appointed Assistant Professor (Special Category) n the Department of Agricultural Chemistry and Physics after serving as Research Associate for the past two ears. Dr. Alli graduated B.Sc. from the Jniversity of Guyana and obtained M.Sc. '77 and Ph.D. '80 degrees from McGill.

The Department of Agricultural Economics welcomes LAURENCE BAKER as Faculty Lecturer. Mr. Baker lid his early education in the United Kingdom before obtaining his M.Sc legree at the University of Manitoba where he was on staff for five years. He will be teaching and assisting with arm management courses in the egree and diploma programs.

MILES BULLEN has been appointed to the staff of the Department f Plant Science as Auxiliary Professor. He comes from Agriculture anada Research Station, Ste-Foy.

JORDAN INGRAM, B.Sc (Agr.) '59, 1. Sc. (Agr.) '61, has been promoted the rank of Full Professor in the epartment of Microbiology. He has een granted a year of sabbatic leave uring which he will pursue further tudies on the physiology and biohemistry of the bacterium *Pseudonas aeruginosa* at the University of eorgia.

TED McKYES, Chairman of the Department of Agricultural Engineering, as been promoted to the rank of Full rofessor.

Joining the department of Plant ciences as Assistant Professor is ICHARD REELEDER, who obtained s doctorate degree from the Univerty of Wisconsin after completing his Sc. degree at the University of New runswick.

The Chairman of the Department Animal Science, DR. ROGER UCKLAND, B.Sc. (Agr.) '63, M.Sc. 5, travelled to Egypt this past sumer as part of a team evaluating their oultry sector and identifying potential ojects.

A tour of Canada organized by Agrodev for a delegation from the Peoples Republic of China included a visit to DHAS and the Macdonald Farm. Below: Farm Director Rudi Dallenbach explains the importance of good forage.

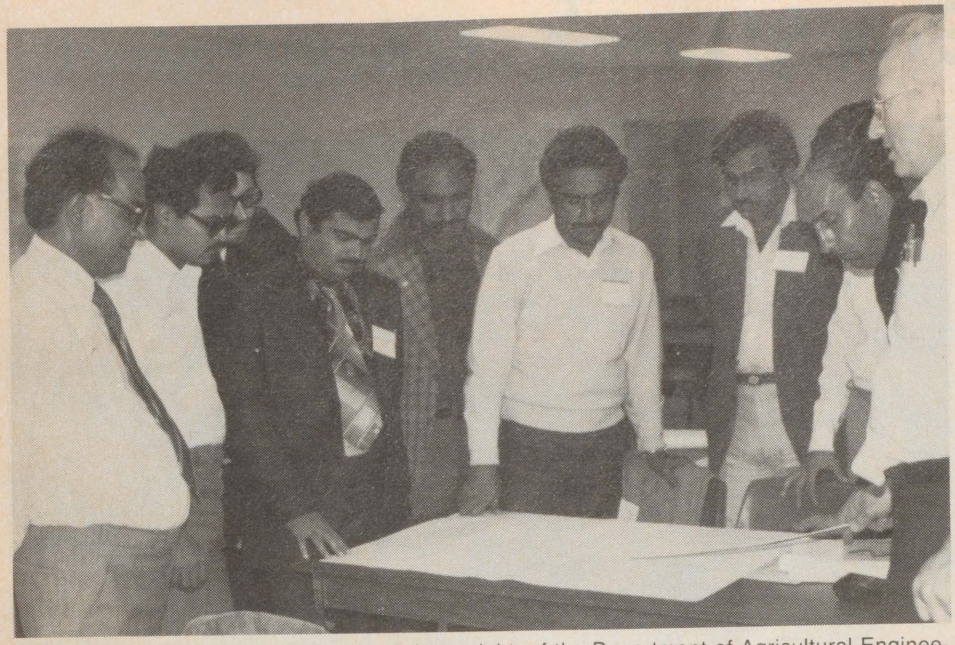
LANITA CARTER, of the School of Food Science, attended the annual meeting of the American Association of Housing Educators at the University of Tennessee in Knoxville in August.

From the Department of Plant Science, DR. KATRINE STEWART and post-grad student GERALD CHEVRIER attended the 21st International Horticulture Congress in Hamburg in late August early September.

PROFESSOR VIJAYA RAGHAVAN, of the Department of Agricultural Engineering, attended the ASAE summer meeting in Madison, Wisconsin, where he was elected to the Presidents' Club. From there he went to Moline, Illinois, to visit the Technical Research Centre of Deere & Co.

For the second time (and in succession) a member of the Lyman Museum has been chosen to receive the coveted Gold Medal of the Entomological Society of Canada for outstanding achievement in Canadian entomology. DR. EUGENE GORDON MUNRO, M.Sc. (Agr.) '41, world-renowned lepidopterist and biogeographer, has been selected as the 1982 recipient (Dr. Kevan, the Museum's Director, received the 1981 award), the award to be made at the joint meeting of the Entomological Society of Canada, Ontario, and America at the end of November. Dr. Munro has been a Research Associate of the Museum since 1980.

off campus



Earlier this year, Professor Robert Broughton, right, of the Department of Agricultural Engineering travelled to Pakistan to observe problems of land reclamation, drainage and irrigation. In late September he served as a tour guide for a group of Pakistani engineers and soil scientist who came to Canada — and Macdonald — to see Canadian drainage design and construction methods.

SID WILLIAMS, B.S.A. '34, M.Sc. (Agr.) '36, former Deputy Minister of Agriculture, who is now President of Hays and Williams Ltd., an agriculture consulting firm, was on the five-member panel for the National Farm Products Marketing Council's public hearing into egg production costs.

THOMAS M. MacINTYRE, B. Sc. (Agr.) '39, M.Sc. (Agr.) '41, former head of the Experimental Farm at Nappam, Nova Scotia, was named a Fellow of the Agricultural Institute of Canada.

RUTH SHAVER, B.Sc (H.Ec.) '47 has retired from the position of Director of Home Economics and Associate Principal of Kemptville College of Agricultural Technology.

GARY R. CAMERON, B.Sc. (Agr.) '67, is in Athens, Greece, where he is Manager, Technical Services, Eastern Mediterranean, for Pepsi Cola International Ltd.

PAUL (PLEUN) VAN DER WEL, B.Sc. (Agr.) '69, has been appointed Managing Director, McCain Europa B.V. (Holland) and Geschä ftsführer McCain GmbH (Germany).

ANDY TERAUDS, B.Sc. (Agr.) '75 has been appointed General Manager of the Agricultural Institute of Canada.

On a warm day in mid July friends and colleagues of the late Professor Harold Roberts Murray gathered on the shores of the Ottawa River (opposite Glenaladale) for the official opening of Murray Park. "Prof" Murray, who passed away in January 1980, was Chairman of the Department of Horticulture from 1940 to 1966. In all he was at Macdonald from 1930 to the early 1970's, ending his services as Director of campus (grounds) maintenance. Above, among the guests listening to the tributes to Prof. Murray are: Mr. and Mrs. Paul Niedermayr. Mrs. Pauline Lloyd, W.C. Shipley, Jean-Pierre Laplaine, the Rowles, Janet Taper, Ede Gypay, Dr. Jean David, Steve Olive, and Marjorie Jenkins. Right: Dr. Howard Steppler was one of the three speakers; the other two were Dr. L.E. Lloyd, shown here with Elissa Murray and son Daniel, and Bob Parkinson.

CHARLES CHARRON, B.Sc. (Agr.) '30, has been appointed Director of Information of the Livestock Feed Board of Canada.

* * *

WALTER A. HUMPHREYS, B.Sc. (Agr.) '35, of Barrie, Ont., was inducted into the American Maple Museum Hall of Fame at Croghan, New York, at a ceremony on May 15, 1982. Mr. Humphreys was presented with a plaque which reads "in appreciation for his pioneer work on use of a pre-heater and years of dedicated work with the maple producers of Ontario — on behalf of the maple industry."

Walter Humphreys was an apple grower for 17 years. He worked for the farm products inspection branch of the Ontario Ministry of Agriculture and Food for 13 years and rose to be supervising inspector for Georgian Bay and Northern Ontario. He was the first maple syrup specialist in Ontario (1966-74). He started syrup production on the road to modernization and was also secretary of the Ontario Maple Syrup Producers Association. After retiring in 1974, Walter accepted a position in Nova Scotia — the first syrup specialist (1975-79), and during that time maple syrup production increased by about 200 per cent. Walter Humphreys is probably best known for the idea of the pre-heater hood which saves 15 per cent of the fuel requirements.

* * *

On June 5, 1982, the Women's Residence-Home Economics Building at Kemptville College of Agricultural Technology was dedicated as Rorke Hall in honour of the late RUTH RORKE who was Home Economics Director from 1942 to 1963. Miss Rorke received her B.H.S. degree in 1925 at Macdonald and was on the staff here from 1930 to 1942. She died in Montreal in 1975.

In August a joint annual meeting of the Canadian and American Societies of Animal Science was held at the University of Guelph. The cannon, a traditional campus landmark, had mysteriously changed colours (to green and gold) during the meeting and was labelled as seen in the photograph above. Several Macdonald Animal Science graduate students, known to have been at the meeting, had a tight-lipped "no comments" in response to inquiries by reporters.

Biotechnology . . .

(Continued from page 11)

on now is: how can the nitrogen-fixing ction of *Rhizobium* be enhanced, thus creasing crop yield? Microbiologists a number of laboratories are studying the genetics and the biochemistry infection by *Rhizobium* so that the acteria can be directly modified by enetic engineering. By identifying the enes which are involved in the process of nodulation and those specifying nitrogen fixation, efforts are being ade to create a super *Rhizobium* hich nodulates plant roots better and kes nitrogen more efficiently.

Not all symbiotic nitrogen fixation is onducted by *Rhizobia* and not all trogen-fixing bacteria attach themelves to legumes. By gaining an unerstanding at the molecular level of e mechanisms by which micro oranisms and plants interact in the nown symbioses it may well be possie to engineer microorganisms that ill fix nitrogen for cereal crops.

The genes for nitrogen fixation are und only in bacteria and among acteria are limited to a very small umber of genera. One exciting possibility currently being worked on feverishly in a number of laboratories is that the genes for nitrogen-fixation from bacterial cells might be transferable to plant cells thus enabling the plants to grow without the need for a source of fixed nitrogen in the soil. Although DNA is the hereditary material in all types of cells, it is organized differently in bacterial cells, and the control mechanisms involved in the transcription and translation of the genetic message are different from those in the cells of higher organisms such as plants. As a first step in the direction of incorporating nitrogen fixing genes from bacteria into plant cells, these genes have been successfully incorporated into yeast cells, cells which have the same type of organization as but which are simpler than plant cells. Even though it has been possible to show that nitrogen fixing genes from bacteria have been stably incorporated into the yeast chromosome the yeast cells do not fix nitrogen. Why? One possibility is that the start and stop signals for translating the message in the two types of cells are different. Does this mean we will not be able to arrange for plant cells to fix their own nitrogen? Not necessarily. The start and stop signals are particular nucleotide sequences in the DNA. Once they have been identified it should be possible to incorporate them into the yeast cells along with the nitrogen fixing genes and perhaps then obtain expression of the genetic message. I say perhaps because there are many factors involved in the successful transcription and translation of a genetic message. Only careful and painstaking research at the molecular level will reveal what these factors are and whether the difficulties can be overcome.

Other lines of investigation which lend themselves to the genetic engineering approach are those which may lead to the acceleration of photosynthesis and to the development of crops that can be grown on saline or highly acidic soil.

I have mentioned only a few of the projects now being worked on and their possible potential. The question is: where are we really going and how much can we reasonably expect? This is difficult to say. In 1937 a committee

of technical experts of the United States government forecast future technological developments in commercial aviation. They predicted that future developments would be largely in the direction of safety and comfort although they considered it possible that planes would be built which would be capable of flying at 20,000 feet and at a speed of 240 miles per hour. Jet engines were not mentioned. Any predictions we can make regarding the future of genetic engineering and biotechnology are likely to be just as wide of the mark. Most of the techniques used in genetic engineering have been developed in the last 10 years. Although marvelous transformations of cells have been accomplished in the laboratory, we still have not seen products of these investigations in commercial production. In a sense, the ideas of genetic engineering are being oversold. Too much is being expected too quickly. In a rush to get in on a possible bonanza, millions of dollars of venture capital are being gambled on genetic engineering companies in the hope of obtaining big returns almost immediately. Difficulties are being experienced. Cells are proving to be more complex than molecular biologists predicted. Some genetic engineering companies are already in financial difficulty. The problem is that this failure of expectations could lead to a great reduction in support for research in molecular biology when this support is most needed. The answers to the problems which have arisen lie in doing more basis research into the mechanisms of life processes. The more we understand about how these processes work the more likely it will be that we can manipulate them to produce cells which will enable us to realize the full potential of genetic engineering and biotechnology. The key lies in understanding. The spin-off from this understanding could be a pay-off beyond our wildest dreams.

Notes on . . .

(Continued from page 23)

how it gets fixed, and who is responsible. Good luck.

How much time will a microcomputer demand?

Initially, a microcomputer could take up several hours per day until you learn how to communicate and the procedure becomes as routine as chewing tobacco. If you have a dairy management program that keeps track of each cow, then you might need 30 seconds per cow per day to record her data. For 100-cow herds, that is nearly one hour. How long does the same process take by hand? The advantage of the computer, however, is that it can summarize all of the data in a matter of seconds and provide information that you have never had before, or information that would take many hours to tabulate. With the proper programs a microcomputer can make you a very informed dairyman. Of course, the information will only be as good as the care put into keeping data up-to-date.

How fast will the microcomputer become outdated?

As soon as you buy a microcomputer it is out of date. Changes in computer technology are so rapid that you might want to wait until next year before buying. However, as long as the hardware and software do the job you want now, then they will continue to do the same job for many years. When you buy a microcomputer or software, you must be sure that the hardware can be upgraded in the future. For example, you should be able to exchange your black and white CRT for a colour model, or you should be able to add another hard disk drive or floppy disk, and not affect the programs you are using. As long as your microcomputer can accommodate the changes in technology, then there is no need to wait if you need a computer now.

From the software or program side, if you buy programs from a company, then there will likely be an agreement you must sign giving you permission to have the programs provided you do not copy them to sell to other people. At the same time, this agreement should entitle you to any improvements that are made in the programs you have. This is one way of keeping up-to-date with programs.

What is the fate of milk recording programs in the microcomputer boom?

Obviously, milk recording programs are going to have to learn how to collect information from farms with microcomputers since there would no longer be a need to be enrolled on milk recording. A microcomputer could project 305-day lactation yields for each cow immediately after milking each day. Why should a dairyman wait two or three weeks for the same information by mail? The microcomputers need to be able to talk to a large computer. This means you may have to add an additional circuit board that allows the microcomputer to act as a telephone and pass data to a central milk recording lab. Or, a dairyman could mail in a backup tape cassette to the lab. People in milk recording question the validity of such records, but their validity is determined entirely by the programs (software) that are used to enter the data, and it is up to the milk recording people to ensure that programs meet their validity tests. They should be leaders in the standardization of microcomputer programs for dairy farmers, but so far there has been little action.

The milk recording business should offer a dairyman, who owns a microcomputer, access to a mass of information. For example, if the milk recording lab gets data from a dairyman's microcomputer through the phone lines, then it is also possible to send all reports back to the dairyman over the same line. Then the dairyman can look at the reports on his CRT or print them on his printer. The milk recording people could also send other news items such as weather forecasts by township or news on sire proofs for production.

A dairyman's microcomputer could also talk with other computers located at the breed association office or the AI organization. Data will flow freely in all directions. Because of this, security codes will become important to restrict the data that leaves the farm. A dairyman does not want his finances to be transmitted all over the world, and it is possible to protect data so that it never leaves the farm.

The microcomputer boom offers many exciting challenges for the future. The progressive dairyman will take them on eagerly to improve his profitability. However, it is wise to learn as much as possible before purchasing a microcomputer.

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Founder's Day	February 10, 1983
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E. Melville DuPorte Lecture	March, 1983
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